

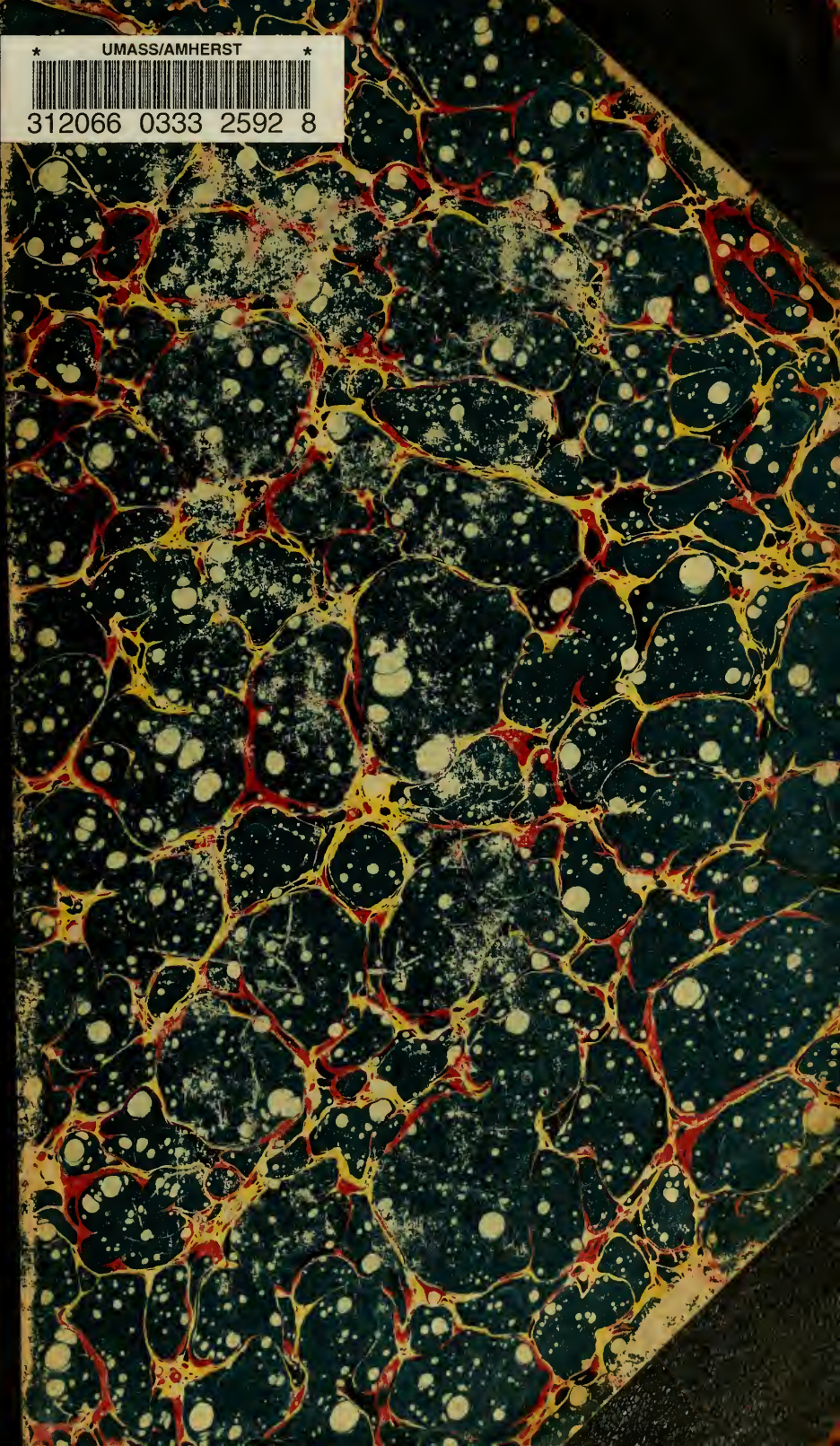
*

UMASS/AMHERST

*



312066 0333 2592 8



20-493
1899
Exchange
20138

LIBRARY

OF THE



MASSACHUSETTS
AGRICULTURAL
COLLEGE

NO. 20138 - ¹⁸DATE 1-1900

SOURCE Exchange

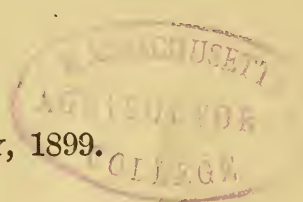
Per
[Redacted]

1899

MASSACHUSETTS CROP REPORT

FOR THE

MONTH OF MAY, 1899.



ISSUED BY

WM. R. SESSIONS,
SECRETARY STATE BOARD OF AGRICULTURE.

BOSTON:
WRIGHT & POTTER PRINTING CO., STATE PRINTERS,
18 POST OFFICE SQUARE.
1899.

C
Per
M 38 1899

CROP REPORT FOR THE MONTH OF MAY, 1899.

OFFICE OF STATE BOARD OF AGRICULTURE,
BOSTON, MASS., JUNE 1, 1899.

We present herewith Bulletin No. 1, Crop Report for the month of May, the first of our series of monthly crop bulletins for the present season. The general plan followed in the issuance of these bulletins will not vary greatly from that pursued in former years. We shall, as last year, endeavor to place the bulletins in the hands of our readers as near the close of the month as possible. An article by some specialist of the Board, or some other equally well-known scientist, will, as usual, be included in each issue. This bulletin contains an article on "Spraying Crops for Profit," by Prof. S. T. Maynard, pomologist of this Board, which we would particularly commend to the attention of our readers.

PROGRESS OF THE SEASON.

The May returns of the United States Department of Agriculture (Crop Circular for May, 1899) show the acreage of winter wheat, after the elimination of that believed to be winter-killed, to be about 25,900,000 acres. This is about 4,000,000 acres, or 13.5 per cent, less than the area estimated to have been sown last fall, but it still exceeds by about 160,000 acres, or six-tenths of 1 per cent, the area of winter wheat harvested last year. For the area remaining under cultivation the average condition is 76.2, as compared with 86.5 on May 1 of last year, 80.2 at the corresponding date in 1897, and 85.9, the mean of the averages of the last ten years.

The average condition of winter rye is 85.2, as compared with 84.9 a month ago, 94.5 on May 1 of last year, 88 at

the corresponding date in 1897, and a ten year average of 90.8.

The average condition of meadows is 84.9, against 92.9 on May 1 of last year, and 93.4 at the corresponding date in 1897. The averages of the fourteen principal hay-producing States range from 110 for California down to 68 for Iowa.

The average condition of spring pasture is 83.5, against 91.2 on May 1 of last year, and 93.4 at the corresponding date in 1897. In general, the unfavorable conditions testify merely to a late season.

The proportion of spring plowing usually done by May 1 is about 75 per cent of the whole amount. The proportion done this year was 57.2 per cent of the total expected, as compared with 72.4 per cent last year, and 61.9 per cent in 1897.

The reports on cotton indicate merely the belief of the correspondents as to the contemplated acreage and are therefore liable to modification. In every cotton-growing State the indications now point to a decreased acreage.

In Massachusetts the average condition of meadow lands May 1 was 92; the average condition of spring pasture, 86; and the proportion of spring plowing done, 36.

WEATHER SUMMARY, JANUARY 1 TO MAY 1, 1899.

[FURNISHED BY THE WEATHER BUREAU, BOSTON.]

January was a month without marked departures from normal meteorological conditions, the small amount of snow-fall being the chief abnormal condition. Excepting in the northern portion of the district the ground was bare a great portion of the time. The temperature for the month averaged below normal in the northern portion of the district, while a slight excess was recorded in the southern sections. For the district as a whole the average was slightly in excess of the normal temperature. The monthly average of precipitation was only .29 of an inch below the normal. The amount of rainfall was in excess, thereby counterbalancing the loss of moisture from the small amount of snow. The

storm of the 24th-25th was the most noted of the month, during which were recorded rain, snow, sleet, hail and thunderstorms.

February was a very cold month, the temperature averaging the lowest in the past decade. The mean monthly temperature was 21.1° , or two degrees below the normal. The precipitation of the month was practically normal. The first half of the month was uninterruptedly cold, the low temperature of the month being confined to the first fifteen days, and the second half uniformly mild. Accordingly the precipitation of the first part of the month was snow, while much rain fell in the latter part. The most noteworthy storm of the month occurred on the 12th and 14th. It was a typical "coast storm" with violent gales. The heavy snow drifted badly causing a complete suspension of railroad traffic in many sections. The loss of life at sea was comparatively small.

March was conspicuous for much unpleasant weather. Cloudiness and precipitation were almost constant. In the northern parts of the district the precipitation was in the form of snow, and the amounts were almost unprecedented. An ice storm of wide-spread area occurred on the 19th, doing considerable damage to trees and also to telegraph wires. A thunderstorm was a phenomena of general record in southern sections on the 5th. The temperature for the month averaged 1.1° below the normal. No agricultural operations could be conducted, as the ground was covered with snow. At the close of the month the season was reported backward in all sections.

April was somewhat remarkable for the large number of clear and fair days. The official record showed seventeen clear days and but six stormy days during the month. The early part of the month averaged cool, while the closing days were unusually warm. The average temperature for the district varied but slightly from the normal, the departure being .9 of a degree above the normal. There was a marked deficiency in precipitation, the average being 1.33 inches below the normal. The weather conditions were most favorable for beginning agricultural operations, and preliminary spring work made excellent progress.

TEMPERATURE AND RAINFALL FOR THE WHOLE COUNTRY.

[FROM UNITED STATES CLIMATE AND CROP BULLETINS.]

Week ending May 1. — The week was warmer than usual in all districts east of the Rocky Mountains except southern Florida. In the central valleys, Lake region, New England and middle Atlantic States the week was decidedly warm, the maximum temperatures ranging from 80° to 90° . In the plateau regions and on the Pacific coast the week was cooler than usual. More than the usual amount of rain fell during the week in the central Missouri and upper Mississippi valleys, upper Lake region, and over limited areas in the Ohio valley and south Atlantic States. The week was drier than usual throughout New England and the middle Atlantic and west Gulf States, and generally elsewhere through the country. The week was exceptionally favorable for the planting, germination and growth of corn. Improvement is generally reported in the condition of winter wheat. Cotton planting was well advanced in northern sections.

Week ending May 8. — The week was warmer than usual in the central valleys, Lake region, and Gulf and Atlantic coast States, the maximum temperatures ranging from 70° to 90° . Over the Rocky Mountain, plateau and Pacific coast districts the week averaged colder than usual. There was more than the usual amount of precipitation over the central Mississippi and Ohio valleys and in portions of the lower Lake region. The week was drier than usual over the northern portion of the Lake region, New England, middle Atlantic and Gulf States, lower Missouri valley and portions of the Rocky Mountain and Pacific coast regions. Excellent progress was made with corn planting in the middle Atlantic States and the central valleys. Winter wheat continued to improve in condition. The seeding of oats was about completed. Rain was needed in New England.

Week ending May 15. — The week was cooler than usual from the upper Missouri valley westward to the Pacific coast, over local areas in the Missouri and Ohio valleys and in the interior of New England. Elsewhere over the greater part of the country the week averaged warmer than usual.

Very heavy rains fell over portions of Texas, Louisiana, Arkansas, in the lower Ohio valley and in portions of the upper Mississippi valley and middle Atlantic States. The week was drier than usual over the greater part of the Lake region and New England, and portions of the middle Atlantic States, and generally throughout the Rocky Mountain regions and California. Excessive rains delayed corn planting in Missouri, Illinois, Iowa and Indiana. Winter wheat made rapid growth in the central valleys. Oats were generally in promising condition and made rapid growth.

Week ending May 22. — The week averaged decidedly cold throughout the Rocky Mountain and Pacific coast regions, and over the northern districts eastward of the Rocky Mountains. Freezing temperatures occurred in northern New England. In the southern States the week averaged warmer than usual. In portions of the middle Atlantic States, Lake region, lower Ohio and central Mississippi valleys, and from the lower Missouri valley northwestward to the north Pacific coast, there was more than the average amount of rainfall. Except over a few local areas of limited extent, the rainfall in New England and the south Atlantic and Gulf States was deficient. The week was generally unseasonably cool and unfavorable for germination and growth, particularly that of corn. Winter wheat was reported to have been considerably damaged by insects. The general condition of the oat crop was promising.

SPECIAL TELEGRAPHIC REPORTS.

[WEATHER BUREAU, BOSTON.]

Week ending May 1. — New England. Boston: Unusually warm and dry week, abundant sunshine; much progress in southern sections; season opens favorably in north portion, although backward; rain needed for pastures and planted ground; general outlook encouraging.

Week ending May 8. — New England. Boston: Week of variable temperatures and insufficient precipitation; several heavy frosts, but not much damage; grass and pastures need rain; planting and sowing general in south, and beginning

in north ; cherries, plums and pears in full bloom ; peaches short ; tobacco plants in excellent condition.

Week ending May 15. — New England. Boston : Clear weather favored farm work ; rain badly needed in central sections ; showers in south very beneficial ; fruit promising ; drought retards growth of grass and corn ; acreage of potatoes large ; early vegetables doing well ; preparation for tobacco planting in progress.

Week ending May 22. — New England. Boston : Cloudy, cold weather retards vegetation ; showers occurred throughout the district and were beneficial, but more rain is needed ; planting progressed in north ; short crop apples indicated, other fruit more promising ; caterpillars in north destroying foliage ; frosts in Maine damaged early vegetation.

THE WEATHER OF MAY, 1899.

The present month of May will be recorded in meteorological history as remarkably deficient in precipitation. This feature will alone characterize the month, as the temperature element, while considerably variable during different periods, has been on the whole about normal. It will be remembered that April also gave a deficiency in rainfall, and the drought has continued uninterruptedly during May, thus forming a rather unusual circumstance for the season of the year, and thereby rendering crop prospects at the present time somewhat vague. At Boston, the total rainfall for the month is but 0.81 inch, or 2.80 inches below the established normal for the station. In other portions of Massachusetts the same condition has obtained, particularly in the southeastern part of the State. The number of days with a measurable amount of precipitation averages about as usual, but there has been no good, soaking rain during the month, such as is necessary at this time of the year.

Comparison with the records of previous months of this name shows that the precipitation is the smallest since 1870, when the Weather Service was established. In May, 1879, the rainfall was considered very light, but it was some .16 of an inch greater than during the present month.

The temperature has averaged about 1° per day above the normal. The warm spell which began in the latter part of April held through the first day of May, and culminated on the second. A short spell of "easterly weather," with much lower temperature, then followed. The coolest period of the month was from the 17th to the 23d, inclusive, when the daily maxima were not far from 50° , and frosts were frequent in the more exposed localities. From the 23d on to the last of the month, the temperature was gradually tending upward, and the month closed as it began, extremely warm.

An abundance of sunshine has been a feature. The number of clear days (14) are twice as many as the cloudy days (7), and on the ten partly cloudy days there was, of course, a good amount of sunshine. No snowfall is reported, and there have been no severe wind-storms.

In the circular to correspondents, returnable May 22, the following questions were asked:—

1. How does the present season compare, agriculturally speaking, with a normal season?
2. What is the promise for pastures and mowings, and did fall seeding winter well?
3. How did the fruit bloom compare with the bloom of former years?
4. What insects appear to be doing the most damage in your locality?
5. To what extent is spraying practised against insects attacking fruit, and is it on the increase in your locality?
6. Is farm help scarce, or plenty; and what proportion would you call good help?
7. What wages, with board and without board, are paid farm help in your vicinity?
8. Will there be any marked change in the acreage of the usual farm crops, and do you note any new enterprises in the line of agriculture?

Returns have been received from 168 correspondents and from them the following summary has been made up.

THE SEASON.

The season opened later than usual in most sections. The warm weather of the latter part of April operated to bring it nearly up to the normal, but the cold, dry weather of May more than offset this, and at time of making returns the season was apparently from one to two weeks behind the normal. The cold nights held vegetation in check and the dry weather has been most unfavorable to the germination of seeds. Rain was badly needed in almost all sections of the State at the time of going to press, and unless the condition of drought is soon relieved many crops must suffer severely.

PASTURES AND MOWINGS.

Mowings are reported to be suffering from want of rain in many sections, and the prospect now is that the hay crop will be less than a normal one. Feed in pastures is also spoken of in many instances as thin and backward and rain is much needed. In view of these conditions we wish to impress on our readers the desirability of putting in an increased acreage of forage crops for green feeding and for the silo. Not for many years has there been as much complaint of pastures and mowings winter-killing as this season, though these complaints are by no means general. There was also more complaint of fall seeding winter-killing than usual, though here, also, the complaint is not general.

THE FRUIT BLOOM.

The fruit bloom as a whole was much below the normal in all sections, with the exception of the southeastern portion of the State, where it was generally reported as a full bloom. Elsewhere in the State, apples were rather below the usual bloom judging from the reports. Pears and plums appear to have blossomed fairly well, though hardly up to the average. Cherry trees generally blossomed full. There was practically speaking no peach bloom, and there were also many complaints of peach trees having been killed by the severe winter weather. Small fruits and berries, where

reported on, were generally said to have blossomed well. The time of the fruit bloom was probably about normal, but the setting and growth of the fruit seems to have been delayed in some cases by the cold nights.

INSECTS.

Not for several years has there been as little damage from insects reported as the present spring. It is believed that the cold weather has done much to hold them in check. As usual, the tent caterpillar is the insect most often spoken of as doing damage, but even it appears to be less numerous than usual. There are very few complaints of injury from canker worms as yet. Other insects spoken of as doing damage are currant worms, bud moths, wire worms, cut worms, white grubs, potato bugs, codling moths, brown-tail moths, asparagus beetles and cranberry vine and fire worms.

SPRAYING.

The practice of spraying appears to be constantly on the increase, but at best its progress is slow. Certainly fewer of our farmers spray than should be the case. Most of the larger fruit growers have sprayed their trees for years and still continue to do so. It is our belief that many more farmers would spray if it were not that they believe the initial expense to be larger than it is. We would call attention to the article on "Spraying Crops for Profit" at the end of this bulletin. In this article will be found directions for spraying all kinds of fruit trees, and also descriptions of apparatus for the purpose which is within the means of all our farmers.

FARM HELP AND WAGES.

Farm help does not appear to be quite as plenty as last year. Strictly first-class help is of course hard to secure, but, as of late years, a considerable proportion of the help available may be classed as good help. Wages average about \$18 per month with board. Board is reckoned at from \$12 to \$16 per month, and where men are hired by the

month without board there is a corresponding increase in the wage paid. Day wages ordinarily average about \$1.25 with \$1.50 in the busy seasons. Wages above \$1.50 are unusual, though in some cases as high as \$2 per day is paid.

ACREAGE OF FARM CROPS.

As expected, there are no marked changes in the acreage of farm crops and but few new enterprises in agriculture. A slight increase in the acreage of potatoes is, however, indicated; also, a slight increase in the tobacco acreage where this crop is grown. The only strictly new enterprises in agriculture reported are a proposed sugar beet enterprise in Essex county and an experiment in hop growing in Dukes county.

NOTES OF CORRESPONDENTS.

(Returned to us May 22.)

BERKSHIRE COUNTY.

Sheffield (DWIGHT ANDREWS). — The season is late and cold. Pastures and mowings are looking well and fall seeding wintered well. The fruit bloom was not up to the average. Tent caterpillars are doing some damage. Spraying is practised somewhat, but not extensively. Farm help is not plenty; half of it is good help. Wages are from \$18 to \$20 per month with board. More potatoes are being planted than usual.

Monterey (WM. S. BIDWELL). — The season is a favorable one, neither early nor late. Pastures are looking fairly well, meadows normal, and fall seeding makes about an average showing. The fruit bloom was lighter than usual, apples and pears making about half a full bloom. Tent caterpillars are doing some damage but no more than usual. Farm help is plenty and half of it good; women for housework scarce, and half of them good. Wages are from \$18 to \$20 per month with board and \$1.25 to \$1.50 per day without board. More corn has been planted than usual, but less for silage, also more potatoes than usual.

Lee (A. BRADLEY). — The season is nearly up to the normal. Pastures and mowings are 10 per cent off the normal and fall seeding 5 per cent off. Very little spraying is done. Farm help is plenty, but only about one in ten is good help. Wages are \$1.50 per day without board and \$1 per day with board for good help. There are no great changes in the line of farm crops, but the interest in poultry raising is increasing.

Richmond (T. B. SALMON). — The season is about an average one. Pastures and mowings are in good condition; but little fall seeding done. The fruit bloom was very abundant. Tent caterpillars are doing some damage. About 25 per cent of our farmers spray their fruit trees, and the practice is on the increase. Farm help is scarce, but three-fourths of it is good help. Wages are from \$12 to \$20 per month with board and from \$1.25 to \$2 per day without board. More grain and all kinds of planted crops will be raised than usual, as all our farmers seem anxious to plough more than usual to reduce the hay crop.

Peru (J. B. SENNETT). — The season is very favorable though a little backward and cold. Pastures are in good condition, and mowings and fall seeding are doing well. The fruit bloom is about an average one. At present no damage is being done by insects. Spraying is not practised in this vicinity. The supply of farm help is equal to the demand and it is mostly of good quality. Wages are from \$15 to \$18 per month with board. There are no changes of importance in the acreage of farm crops.

Cheshire (L. J. NORTHUP). — The season is quite favorable. Pastures and mowings promise well; fall seeding winter-killed to some extent. Ungrafted apple trees are blooming fuller than grafted. Tent cater-

pillars are doing some damage, though they are not as plenty as in former years. Spraying is practised to some extent. Farm help is becoming more scarce from year to year and only 10 per cent is fair help. Wages are \$20 per month with board and \$10 to \$12 per month additional without board. Millet is coming into use more than formerly, otherwise no change in the acreage of farm crops.

New Ashford (ELHIU INGRAHAM). — The present season compares poorly with a normal one. Pastures and mowings are very backward, and fall seeding is in fair condition. The fruit bloom was a fair average. Tent caterpillars are doing some damage. There is no spraying done in this locality. Farm help is scarce and about half of it good help. Wages average about \$20 per month and board. About the usual acreage of farm crops will be grown.

Florida (E. D. RICE). — Vegetation started early, but the nights have been cool which has kept early crops back. Pastures and mowings looked well three weeks ago and with rain there will still be a normal hay crop. The fruit bloom is much above that of last year. No insects have appeared as yet. Spraying is not practised in this town. Farm help is plenty and about half of it is good help. Good help is paid \$1 per day with board and \$1.50 per day without board, other help all prices. There will be about the usual acreage of all farm crops.

FRANKLIN COUNTY.

Rowe (J. F. BROWN). — The season is fully up to the average. Fall seeding looks first class, but pastures and mowings do not look quite as well as last year. The fruit bloom is light as this is the off year. Tent caterpillars are doing some damage. Spraying is not much practised and is not on the increase. Farm help is scarce and about half of it is good help. Wages are about \$15 per month with board and \$1.25 per day without board. The acreage of farm crops is about as usual and there are no new enterprises in agriculture.

Leyden (U. T. DARLING) — The season is about an average one agriculturally speaking. Pastures and mowings are in much need of rain. The fruit bloom is not above the average. No insects are doing damage as yet. Spraying is but little practised. Farm help is not plenty and about three-fourths of it is good help. Wages are from \$18 to \$20 per month with board. There will not be much change in the acreage of farm crops except that the acreage of potatoes will be increased.

Shelburne (G. E. TAYLOR) — The season is very encouraging except as regards the apple crop. Pastures and mowings promise well except on poor land. The fruit bloom was below the average. No insects are doing damage as yet. Spraying is practised by only a few and increases but slowly. Good help is rather scarce. Wages range from \$15 to \$20 per month with board. The acreage of farm crops will be about as usual except that there may be an increase in that of potatoes. Rain is very much needed.

Conway (J. C. NEWHALL). — The season is very cold and backward and not nearly up to the average. It has been so cold and dry that pastures and mowings are very short. The apple bloom is very short, no peaches, some plums and cherries and a few pears. Tent caterpillars are doing some damage. Spraying is but little practised. All good help can get work and about half our help is good. Wages are about \$20 per month with board and about \$30 per month without. I think there will be a little increase in the acreage of corn and tobacco.

Sunderland (J. M. J. LEGATE). — The season has been very cold and dry and is ten days late at present. Pastures are short and there will be a short hay crop; fall seeding generally wintered well. Apple bloom

full, no pear or plum bloom and peach trees are nearly all dead. Insects are doing no damage as yet. Spraying is not practised in this vicinity. Farm help is scarce and three-fourths of the supply good help. Wages are from \$15 to \$18 per month with board and from \$1.25 to \$1.50 per day without board. There is an increase in the acreage of onions and there will also be one in that of tobacco.

Wendell (N. D. PLUMB).—The season is somewhat backward and the weather very cold and dry. Fall seeding looks well, but pastures and mowings need rain. Only about one-fourth of our fruit trees are in bloom. No insects have appeared as yet. Little spraying is done here. Good help is scarce, as always, perhaps one-fifth of our help is good. Wages are from \$17 to \$20 per month with board and \$1.50 per day without board. There are no new enterprises in agriculture, but the acreage of corn is larger than for many years.

New Salem (DANIEL BALLARD).—The season is a little below the normal at the present time. Seeding wintered fairly well; pastures and all grass lands need rain. Apple bloom medium, pear bloom light. Tent caterpillars are doing some damage. Very little attention is paid to spraying as yet but it is slowly on the increase. Help is rather scarce but mostly good. Wages range from \$12 to \$20 per month with board and from \$1 to \$1.50 per day without board. There will be few changes in the farming of this vicinity. Many fields are becoming quite dry and rain is much needed.

HAMPSHIRE COUNTY.

Greenwich (WM. S. DOUGLAS).—The present season is now very late. Pastures and mowings promise well and fall seeding is in good condition. The fruit bloom is much below the normal. Tent caterpillars are doing some damage. Spraying is not practised at all in this locality. Farm help is not very plenty and good help forms but a small proportion. There will be but few changes in the acreage of farm crops and no new enterprises in agriculture.

Pelham (J. L. BREWER).—The season is a week later than usual. Grass winter-killed badly on wet, level land. The fruit bloom was about normal except that there were no peach blossoms and many peach trees are dead. Tent caterpillars and currant worms are doing some damage. Insecticides are used but very little. Farm help is plenty and about 90 per cent of it good. Wages are from \$1 to \$1.25 per day and dinner. There are no marked changes in the acreage of farm crops.

Hadley (H. C. RUSSELL).—The season has been cold and dry and planting is later than usual. Grass in pastures is thin and the hay crop will be light if the dry weather continues. Apples did not make a very full bloom and other fruit trees blossomed poorly. No insects have appeared as yet. Spraying is practised to some extent and is on the increase. Farm help is not quite as plenty as usual. Wages are from \$16 to \$18 per month with board and \$1.25 per day without board. There is not much change in the acreage of the usual farm crops.

Northampton (D. A. HORTON).—The season is as forward as last year. Pastures are in fair condition, mowings look badly, fall seeding winter-killed a good deal. All fruit trees have blossomed full. No insects are doing damage as yet. Spraying is very little practised in this section. Good help seems to be scarce, not over one-third of our farm help being good. Wages range from \$14 to \$20 per month with board and about \$30 per month without board. There will be a large acreage of tobacco, onions and corn and a light one of potatoes.

Williamsburg (F. C. RICHARDS).—The season is backward as both weather and ground are too cold for plant growth. Pasturage is in good condition, mowings 25 per cent off. Apples 50 per cent of a full bloom, cherries 100, pears 50, plums 60, peaches 10, many peach trees badly

winter-killed. Tent caterpillars are just appearing. Probably not over one-fourth of our growers spray and it is not increasing. Poor help is fairly plenty, good help very scarce. Wages are \$15 to \$20 per month with board and from \$30 to \$35 per month without board. There may be a slight increase in the acreage of tobacco.

Huntington (H. W. STICKNEY).—The prospect for grass and hay is not very promising. The fruit bloom is about as usual. Insects are doing remarkably little damage so far this season. But few practise spraying in our town. Good help is not very plenty. Wages are from \$12 to \$15 per month with board. The acreage of farm crops will be about as usual. Never was there so much grass land winter-killed; hay will probably be worth \$10 to \$12 per ton before the first of July.

Plainfield (S. W. CLARK).—The season is a little backward and rather dry. Grass winter-killed more than usual, fall seeding included. The fruit bloom was rather late and below the average. No insects have appeared as yet. A few practise spraying with success and it may be on the increase. We are flooded with tramps and have a fair supply of good help, though first class American help is scarce and can command almost any price. Wages are from \$18 to \$22 per month with board and \$11 per month for green Polanders. More potatoes have been planted than usual.

HAMPDEN COUNTY.

Chester (P. M. ADZIMA).—The season is about normal, but the nights are too cool. The promise is good for pastures and mowings. The fruit bloom was about normal, but some damage has been done since by a frost. Tent caterpillars are doing some damage. Spraying is practised to some extent and is on the increase. Wages are about as in former years. There are no changes in the acreage of farm crops and no new enterprises in agriculture.

Tolland (E. M. MOORE).—The present season is about ten days later than usual. Pastures were looking badly but have improved since the recent rains and are now quite green. Fall seeding wintered fairly well. The fruit bloom is about an average with former years. Farm help is scarce and but a small proportion would be called good help. Wages are about 75 cents per day with board and \$1.25 per day without. There are no particular changes in the acreage of the usual farm crops.

West Springfield (J. N. BAGG).—The season is backward because dry and cool. Grass is thin and light everywhere, though fall seeding wintered well. The fruit bloom is lighter than usual. The tent caterpillar is the most troublesome insect as yet. Not much spraying is done but the practice is increasing. Farm help is scarce but tolerably good; Poland and Bohemia furnish the larger part. Wages are from \$16 to \$26 per month, the latter without board. There are no marked changes in the acreage of farm crops and no new enterprises.

Chicopee (R. W. BEMIS).—The season has been rather dry when compared with most years. The grass is more winter-killed than usual and not as thick as last year. The fruit bloom was quite heavy. Insects are not doing much damage as yet. There is plenty of help with us but it is not as capable as one would wish. Wages are from \$15 to \$25 per month with board and from \$1 to \$1.50 per day without board. There will be no marked changes in the acreage of farm crops, but there is more garden truck raised than formerly.

East Longmeadow (J. L. DAVIS).—The season has been exceedingly dry so far. Pastures and mowings have suffered for want of rain, but not much fall seeding winter-killed. The fruit bloom is about an average. Spraying is not practised in this town to my knowledge. Farm help is scarce and none are obtainable competent to work without con-

stant supervision. Wages are \$1.50 per day without board and from \$15 to \$20 per month with board. There will be no marked changes in the acreage of farm crops.

Palmer (O. P. ALLEN). — The season has been cold and backward. The present outlook for pastures and mowings is very good. The fruit bloom was smaller than usual and the peach trees are nearly all dead. Few insects have appeared as yet. Spraying has not been practised to any great extent. Farm help is rather scarce with about one-third of it good. Wages are about \$1.50 per day without board and about \$1 per day with board. There are no marked changes in the line of agriculture.

Holland (FRANCIS WIGHT). — The season is later and the prospect not as bright as last year. Grass in mowings is thin and it is backward in pastures. The fruit bloom is much lighter than usual. Tent caterpillars are doing some damage. Not much if any spraying is done here. Help is scarce and we call any help good that we can get. Wages are \$1 per day with board and \$1.25 to \$1.50 per day without board. There are no new enterprises in agriculture except that several have gone into raising chickens this year.

WORCESTER COUNTY.

Southbridge (GEO. L. CLEMENCE). — The season is a little late. Pastures and mowings are in need of rain; fall seeding wintered well. Pears made a good bloom, apples poor, peaches did not blossom. Farm help is scarce and half of it is very poor. Wages are about \$5 per week with board.

North Brookfield (J. H. LANE). — The season has been cold and dry. Lack of rain is telling on pastures and mowings on poor land. Apples made a good bloom, pears fair, plums full. The weather is too cold for insects to appear. Very little spraying is done here. Farm help is scarce and some of it mighty poor, perhaps 10 per cent is good help. Wages are from \$18 to \$24 per month with board and from \$1.50 to \$1.75 per day without board. Grass must be a short crop as it has winter-killed very badly, in forty years I never saw the like.

Oakham (JESSE ALLEN). — The present season compares very favorably with the normal. Pastures and mowings are in good condition and fall seeding wintered well. Apples made a very light bloom, pears plentiful. No insects are doing serious damage. Spraying is but very little practised. Farm help is plenty and half of it is good help. Wages are from \$15 to \$20 per month with board and about \$10 additional without board. There are no marked changes in the acreage of farm crops.

Dana (E. A. ALBEE). — The season is about ten days later than the normal. We need rain for pastures and mowings, and grass winter-killed quite badly. There is scarcely any bloom on apples and none at all on anything else. Tent caterpillars are doing some damage. Spraying is but little practised and is not increasing. Farm help is scarce and not over one-fourth is good help. Wages are from \$15 to \$20 per month with board and about \$1.50 per day without board. The acreage of potatoes is increased over last year.

Royalston (C. A. STIMSON). — The season is dry and cold and ten days late. Pastures and mowings are in need of moisture; fall seeding winter-killed in spots. The fruit bloom was below the average. Spraying is not practised at all in this locality. Help is scarce and half of it is good help. Wages are \$18 per month with board and \$1.50 per day without board. There are no marked changes in the acreage of farm crops and no new enterprises in agriculture.

Gardner (A. F. JOHNSON). — The season is rather backward and is cold and dry, small seeds cannot germinate. Grass is short and late.

The fruit bloom is about average. No insects are doing damage as yet. Spraying is not practised in this locality. Farm help is plenty for all demands. Wages are from \$15 to \$25 per month with board and from \$1.25 to \$1.50 per day without board. There will be a slight increase in the acreage of potatoes and perhaps a little falling off in that of corn.

Ashburnham (ALBERT NEEDHAM).—The season is rather backward it having been so dry the past six weeks. Feed has been slow in growing but has been gaining since the recent showers; fall seeding has winter-killed to some extent. The fruit bloom is rather better than usual for an off year. Tent caterpillars are doing some damage. Spraying is but very little practised. Farm help is very hard to get. Wages are from \$18 to \$25 per month with board and \$35 to \$40 per month without. The acreage of farm crops is about the same as usual.

Fitchburg (JABEZ FISHER).—Up to the middle of April the season was normal, since then very dry, but warm at first which brought the fruit bloom out seven days earlier than for forty-three years, since bloom the weather has been cold and time has been lost. Pastures and mowings have wintered well and only lack moisture for the best results. Apples did not make more than a one-fourth bloom, plums and cherries well filled, no peaches. Insects are doing little damage. I doubt if 20 per cent of the trees hereabouts get sprayed. Poor help is abundant always, but good is scarce. Wages are about \$20 per month with board and \$1.50 per day without board.

Bolton (H. F. HAYNES).—The present season is fully up to the normal. Fall seeding wintered quite well, but pastures and mowings winter-killed badly. There was a very light bloom of all kinds of fruit. No insects are doing damage as yet. Very little, if any, spraying done in this vicinity. Farm help is rather scarce. Wages are from \$17 to \$25 per month with board and nearly all board their help. Judging from observation, there will be no great changes in the acreage of farm crops and no new enterprises.

Northborough (J. K. MILLS).—The season is ten days late. Pastures and mowings are in good condition and fall seeding wintered well. The fruit bloom was not over 75 per cent of a full bloom. Canker worms and tent caterpillars are doing some damage. Sixty-five per cent of our farmers spray their fruit trees. Farm help is plenty and three-fourths of it is good. Wages range from \$15 to \$25 per month with board and from \$1.25 to \$2 per day without board. The acreage of farm crops will be about as usual and there are no new enterprises in agriculture.

Worcester (S. A. BURGESS).—The present season is an average one, agriculturally speaking. Pastures and mowings are in good condition; one-fourth of the fall seeding winter-killed. The fruit bloom was about 75 per cent of an average. Cut worms, currant worms, wire worms and white grubs are doing some damage. There is a moderate amount of spraying done, but it is not on the increase. Farm help is plenty and half of it is good. Wages are from \$15 to \$25 per month with board and from \$1 to \$2 per day without board. Good winter apples will be scarce and peaches are a failure.

Oxford (D. M. HOWE).—The season is about a normal one. The promise for pastures and mowings is good and fall seeding wintered well. But few trees have bloomed, especially in case of the apple. Tent caterpillars are doing some damage. Spraying is on the increase and many spraying machines have been sold here this season. Farm help is very scarce but seems to be good help. Wages are \$1.50 per day without board and \$1 per day with board. There are no marked changes in the acreage of the usual farm crops.

Blackstone (O. F. Fuller).—The season is a backward one. Pastures and mowings do not look promising, but fall seeding looks well. I should say the fruit bloom is below that of former years, except plums

which bloomed full. Only a few make a practice of spraying. Good farm help is scarce. The wages paid are from \$5 to \$20 per month according to the grade and quality of help. I do not think there is any marked change in the acreage of farm crops.

MIDDLESEX COUNTY.

Marlborough (E. D. HOWE).—With a little rain the season would be well up to the average. Pastures and mowings made a good start but need rain; fall seeding wintered well. The fruit bloom was about 25 per cent of a full bloom. Currant worms and tent caterpillars are doing some damage but are fewer than usual. Perhaps half of our fruit growers spray and the practice is increasing. Farm help seems to be more plenty than usual; about one-fourth of it is good. Wages are from \$20 to \$25 per month with board and \$1.75 per day without board. There is a slight increase in the acreage of potatoes.

Stow (G. W. BRADLEY).—I do not think the season is as forward as usual. Pastures and mowings on high land are suffering for rain; fall seeding looks well as a whole. Apple bloom light and scattering, no peaches, pears rather light, not many plums. Tent caterpillars and cut worms are doing some damage. Spraying is little practised. There is plenty of farm help but very little good help. Wages are from \$12 to \$25 per month with board and from \$1.25 to \$1.75 without board. There will be about the usual acreage of crops in this vicinity.

Townsend (G. A. Wilder).—The season compares favorably with a normal one. The promise for pastures and mowings is not as good as last year and fall seeding did not winter well. The fruit bloom was lighter than usual. Tent caterpillars are doing some damage. Spraying is not generally practised but is on the increase. Farm help is plenty and three-fourths of it good help. Wages are from \$1 to \$1.50 per day without board and from \$12 to \$20 per month with board. More attention than formerly is paid to small fruits, peaches and plums.

Chelmsford (P. P. PERHAM).—The season is far more backward and cold than the normal. Pastures are backward and the outlook for the hay crop is poor. The fruit bloom is much less than the average, especially apples. Tent caterpillars are doing some damage. There is little spraying done in this vicinity, less than ever this season. Good farm help is scarce and about one-third of the applicants would be called good help. Wages are \$20 per month with board and \$30 per month without. There are more apple and peach trees being set out this year than usual.

Tewksbury (G. E. CROSBY).—The season compares fairly with a normal season. Pastures and mowings are about 25 per cent off the normal in condition. The fruit bloom is very light. Very little spraying is done here. Farm help is scarcer than for several years and a little over half of it is good help. Wages are from \$15 to \$20 per month with board and from \$1 to \$1.50 per day without. There seems to be a slight increase in the use of glass for forcing vegetables.

Woburn (W. H. BARTLETT).—Vegetation would be about with the average if it were not so dry. All grass lands are feeling the effects of the extreme dry weather. Apples are not over one-third of a full bloom, pears full, cherries full, no peaches, quinces full. No insects are doing damage as yet. Spraying is on the increase. Plenty of help, nearly all poor, good help very, very scarce. Wages are \$1.50 per day without board. I think about the usual acreage of crops will be planted. Peas are quite late. Potatoes and beans are also up. Cabbages are set out but grow slowly.

Arlington (W. W. RAWSON).—The present season is very late. Grass is very light in pastures and mowings. No insects are doing

damage as yet. Farm help is plenty but very poor. Wages are from \$15 to \$20 per month with board. The acreage of farm crops is less than usual. Crops are very backward and the ground very dry; it looks like small crops and good prices.

Lincoln (SAMUEL HARTWELL).—The season is unusually dry. The promise is bad for both pastures and mowings on naturally dry land. The apple bloom is the smallest for many years, no peach bloom, cherries and plums blossomed fully. There is very little spraying done in this vicinity and no increase of the practice. Farm help is fairly plenty and good. Good men command \$20 per month and board and \$35 per month without board. About the average amount of crops are being put in.

Newton (OTIS PETTEE).—The season is about an average one. The dry weather since the first of April has had a tendency to shorten pastures and mowings a little, but with a little rain the prospect is fair. The apple bloom is light with quite a full bloom of cherries. A few tent caterpillars are seen. The supply of farm help is about as in former years. Wages are from \$20 to \$25 per month with board. There is no marked change in the acreage of farm crops.

Sherborn (N. B. DOUGLAS).—The season is not at all a favorable one. Pastures and mowings are very poor, but fall seeding wintered well. The apple bloom is light, no peach bloom, pears and cherries full. It has been so cold that no insects have appeared as yet. Spraying is largely practised in this locality. Farm help is not plenty and only about half of it is good. Wages are \$12 to \$20 per month with board and \$1.50 per day without. Unless we get heavy rains in the near future the hay crop will be a failure.

ESSEX COUNTY.

Salisbury (WESLEY PETTENGILL).—The season is cold and backward. Pastures and mowings are in poor condition and fall seeding winter-killed some. The apple bloom was very light, pears medium, peaches very light, plums good. Tent caterpillars are doing some damage. Spraying is practised mostly against canker worms and does not increase much. Farm help is plenty and 25 per cent of it is good help. Wages are \$1 to \$1.50 per day without board and \$15 to \$22 per month with board. There are no marked changes in the acreage of farm crops but there will not be as much planted this year as common.

Haverhill (EBEN WEBSTER).—The season is a little later than usual but not much. Pastures and mowings winter-killed somewhat; fall seeding wintered well. Apples and pears made about half the usual bloom. There has been but little trouble from insects. Spraying is somewhat on the increase but not much. Farm help is plenty and one-half of it is good help. Wages are \$1.50 per day without board and \$20 per month with board. There are no marked changes in the acreage of farm crops.

Andover (M. H. GOULD).—The present season is cold and dry. Pastures and mowings are light; fall seeding wintered well. The fruit bloom is lighter than usual. Tent caterpillars are doing some damage. Spraying is not practised to any extent. Farm help is scarce and not over one-sixth of it is good help. Wages range from \$16 to \$20 per month with board and from \$25 to \$33 per month without board. The raising of sugar beets is somewhat talked of but does not take very well around here.

Newbury (GEO. W. ADAMS).—The season is dry but otherwise about average. Fall seeding wintered well, pastures fair on low lands, mowings very poor and a short crop is promised. There are hardly any apple blossoms, other fruit fair. Tent caterpillars are doing some damage. One-fourth to one-half of our fruit trees are usually sprayed but there is no perceptible increase. Farm help is scarce and not over 10

per cent good, 50 per cent practically worthless. Wages are \$1.50 per day without board and from \$16 to \$26 per month with board. There is a general feeling of discouragement among the more enterprising and formerly prosperous farmers and a marked increase of farm mortgages.

Ipswich (O. C. SMITH).—The season has been too dry and the nights too cold for favorable results. The hay crop will be small and pastures grow but slowly and are poor; fall seeding winter-killed somewhat. Winter apples showed a one-third bloom, pears full, cherries bloom and set full, early apples about half a bloom. Tent caterpillars are doing some damage. The practice of spraying is generally increasing. Good help is scarce and other help none too plenty. Wages are \$18 to \$25 per month with board and \$1.50 to \$2 per day without board. The acreage of potatoes has increased a little, other crops about as usual.

Topsfield (B. P. PIKE).—The season is about a normal one. Fall seeding wintered well. Pastures and mowings would be all right with rain, but it is very dry now. Apples had a very short bloom; plums, cherries and pears fair; not many peaches. No insects have appeared as yet. There being a light apple bloom and no canker worms there will not be much spraying. Good help is scarce but poor help is plenty enough. Wages are from \$18 to \$22 per month for good help with board and \$1.50 per day without board. There are no marked changes in the acreage of farm crops.

NORFOLK COUNTY.

Millis (E. F. RICHARDSON).—The season is dry and late. Pastures and mowings promise to be very short unless we have plenty of moisture soon; some of the late fall seeding winter-killed. There was a fair fruit bloom. Asparagus beetles and tent caterpillars are doing some damage. Our farmers spray only against the canker worm. Farm help is plenty, but good help is scarce. Wages are about \$18 to \$20 per month with board and about \$1.25 per day without board. There will be more land in potatoes this year and less in corn than usual.

Franklin (C. M. ALLEN).—The season is an average one. Pastures and mowings do not promise as well as last year. Fall seeding wintered fairly well. Apples made a three-fourths bloom, peaches and pears very light. Very few insects have appeared as yet. Very little spraying done hereabouts. There is help enough but not over 10 per cent of it is good help. Wages are \$18 per month with board and \$1.50 per day without board. There are no marked changes in the acreage of the usual farm crops.

Norfolk (GEO. E. HOLBROOK).—The season has been too cold and dry so far. Grass is not as good as last year at this date. Scarcely any Baldwin apples have blossomed; light bloom on greening, russet and early apples; small fruits made a good bloom except peaches. Tent caterpillars are injurious to a small extent. Spraying is not on the increase. Good help is scarce and about half of the help is poor. Wages range from \$16 to \$20 per month with board and from \$30 to \$45 per month without board. There will be a smaller acreage of corn and a larger one of potatoes than usual on account of the high prices of the latter.

Canton (E. V. KINSLEY).—Crops are looking well and the season is as far advanced as usual. Pastures need rain now, but all well-kept mowings are looking finely; fall seeding is all right. Pears made a full bloom, winter apples very thin, no peaches. Insects are doing no damage as yet. There is some spraying, but not much, and it is increasing somewhat. Help is plenty, but not over 12 per cent is good help. Wages are from \$15 to \$25 per month with board and about \$1.50 per day without board. There is no material change in the acreage of the usual crops, but there is an increase in the production of milk and garden truck.

Randolph (R. A. THAYER).—The season compares very favorably with the normal. Pastures and mowings are looking well, as is also fall seeding. Fruit trees made about an average bloom with the exception of apples. No insects are doing damage at present. Spraying is not practised to any great extent. The supply of farm help is about as usual, good help very scarce. Wages are from \$15 to \$25 per month with board and from \$40 to \$45 without board. The acreage of farm crops is about as usual with no new enterprises in agriculture.

Cohasset (E. E. ELLMS).—The season compares well with a normal season. Pastures and mowings are looking well; fall seeding did not winter well. The fruit bloom was better than last year. Tent caterpillars and green flies are doing some damage. Spraying is on the increase. Farm help is scarce and not over 10 per cent is good help. Wages are about \$25 per month with board and about \$45 per month without board. There are no marked changes in the acreage of farm crops and no new enterprises in agriculture.

BRISTOL COUNTY.

Norton (WM. A. LANE).—The season is not as favorable as last year but is about an average. Pastures and mowings look fairly well and fall seeding wintered well. There was about an average fruit bloom. It is too cold here for insects to do damage as yet. Spraying is practised to no great extent but it is on the gain. Farm help is scarce. The best farm help gets about \$30 per month without board; others from \$10 to \$15 per month with board. There are no great changes in the acreage of farm crops.

Raynham (N. W. SHAW).—The season is later than usual. Pastures are in fair condition, but mowings are not in good condition. There was a full average fruit bloom. No insects are doing any particular damage as yet. There is but little spraying done and not as much this year as usual. Farm help is very scarce and but a small proportion of it good help. The acreage of farm crops is considerably decreased owing to the difficulty of obtaining help and the small profit in former years.

Seekonk (FRED A. HOWE).—Everything started well, but the season is now later than usual. Pastures and mowings are looking well and fall seeding is all right. There was a heavy fruit bloom this year. Spraying is not practised at all by our farmers. Farm help is scarce but is mostly good. Wages range from \$18 to \$25 per month with board and are about \$1.50 per day without board. There will be about the usual acreage of farm crops and no new enterprises in agriculture.

Somerset (JOSEPH GIBBS).—Vegetation is about as forward as usual. Pastures look promising, but meadows do not look very well. Peaches made a light bloom, other fruits full. Spraying is not practised in this vicinity. Farm help is plenty with wages about \$25 per month with board, and only a small per cent good help. Potatoes show an increased acreage and growing vegetables under glass is on the increase. The acreage of strawberries is reduced but they promise a good crop. New meadows winter-killed in many places.

Westport (A. S. SHERMAN).—The spring has been rather cold and vegetation is backward. Pastures and mowing lands are in good condition. The fruit bloom is very good, better than last year. Canker worms and currant worms are plenty. Very little spraying is done here. Help is plenty, but three-fourths are not worth hiring; Portuguese are our best help. Wages are \$18 per month with board and \$1 50 per day without board. Very little field corn will be planted, other crops about as usual.

Acushnet (M. S. DOUGLAS).—The present season is not favorable as it has been too dry for all vegetation. Pastures are short and a short hay crop is promised; fall seeding wintered well. The fruit bloom is better than for three years past. Cut worms and tent caterpillars are

very plenty. There is not much spraying done here but more than formerly. Farm help is scarce and one-fourth is good help. Wages are \$1.50 per day without board and from \$20 to \$25 per month with board. There are no marked changes in the acreage of farm crops. Strawberries are looking finely where they were not winter-killed.

PLYMOUTH COUNTY.

Brockton (DAVIS COPELAND).—The season is a little late, and cold and dry. The promise for pastures and mowings is fairly good on good land. The fruit bloom is about three-fourths of a full bloom. The season is so late that not much damage has been done by insects as yet. Very little spraying is done in this locality. Farm help is plenty, but the percentage of good help is very small. Wages are from \$1.25 to \$1.50 per day without board and from \$12 to \$25 per month with board.

Bridgewater (ROWLAND CASS).—The season is late with cold weather prevailing. Pastures are in fair condition, mowings not promising at present; early sown fall seeding wintered well, late sown, poorly. Fruit trees blossomed full. Tent caterpillars are doing some damage. Spraying is not practised in this vicinity. Farm help is plenty enough and most of it is good. Wages are \$18 per month with board and \$1.50 per day without board. Potatoes show an increased acreage, other crops about normal.

Pembroke (NATHANIEL MORTON).—The season is colder than usual and the absence of rain retards crops. Pastures and mowings do not promise well; fall seeding is in fair condition. Apple trees, with the exception of Baldwins, made a full bloom, peaches very poor, pears very good. No insects are doing any particular damage. Spraying is not generally practised. Farm help is scarce and a large proportion is good help. Wages are \$1.50 per day without board; our farms are small and few are hired with board. There are no marked changes in the acreage of farm crops and no new enterprises in agriculture.

Kingston (GEO. F. CHURCHILL).—The season is very late. Pastures and mowings are in fair condition and fall seeding wintered well. The fruit bloom was better than for two years past. Tent caterpillars are doing some damage. There is very little spraying done and the practice does not increase. Farm help is scarce. Wages are a \$1.50 per day without board; few are hired with board. There are no changes in the acreage of farm crops and no new enterprises in agriculture.

Carver (J. A. VAUGHAN).—The season compares well with an average one. Pastures and mowings are in fair condition and fall seeding wintered well. The fruit bloom was about average. There are no insects doing damage as yet except a few tent caterpillars. Farm help is not as plenty as last year but is generally good. Wages are \$1.50 per day of nine hours without board. There are no special changes in the acreage of farm crops.

Wareham (A. B. SAVARY).—The season is about three weeks late. Pastures and mowings are looking well; very little fall seeding is done. The fruit bloom was above the average. Very few insects have appeared as yet owing to the cold weather. There is practically no spraying done in this vicinity. Good help is scarce, the summer people taking the best. Wages are from \$1.25 to \$2 per day without board and from \$15 to \$20 per month with board. The acreage of farm crops is about as usual. In some localities strawberries winter-killed to some extent.

BARNSTABLE COUNTY.

Bourne (D. D. NYE).—The season is very backward compared with last year. Pastures promise well, mowings look light; fall seeding is doing well. There was a fair fruit bloom. Tent caterpillars are doing

some damage. There is no spraying being done. Farm help is very scarce with half of it good help. Wages are \$2 per day without board and \$20 per month with board. There are no marked changes in the acreage of farm crops and no new enterprises in agriculture.

Mashpee (W. F. HAMMOND).—The season is below the average agriculturally speaking. Pastures and the hay crop promise to be short; fall seeding wintered well. The fruit bloom was about an average one. Fire worms and cut worms are doing some damage. Spraying has not been practised to any extent. Farm help is plenty and three-fourths of it is good help. Wages are about \$32 per month without board and about \$20 per month with board. There will be about the usual acreage of farm crops, but there is a marked tendency in favor of grass and small fruits.

Barnstable (JOHN BURSLEY).—The season is ten days late. Pastures and mowings are very short and need rain and warmer weather. The fruit bloom was a full average one. Tent caterpillars are doing some damage. Spraying is but very little practised and is not increasing. Farm help is scarce with half of it good help. Wages are about \$20 per month with board and about \$1.50 per day without board. There will be no marked changes in the acreage of farm crops. Continued cold, dry weather is causing considerable uneasiness among farmers who have stock to feed.

Dennis (JOSHUA CROWELL).—The present season is about an average one. The outlook for pastures and mowings is not good; fall seeding wintered well. The fruit bloom is the best for three years. The cranberry vine worm is doing some damage, other insects not plenty as yet. Spraying is practised against cranberry insects and the practice is increasing. There is a fair supply of help and probably half of it is good. Wages are \$20 to \$25 per month with board and \$1.50 per day without board. I note but few changes in the acreage of farm crops.

Brewster (J. H. CLARK).—The season is very cold and dry. Pastures and mowings are very backward, but fall seeding wintered well. The fruit bloom was fully up to the average. Cranberry worms and tent caterpillars are doing some damage. Very little spraying is done here. Help is plenty and the greater part of it is good. Wages are \$1.50 per day without board and \$20 per month with board. There are no marked changes in the acreage of farm crops.

Truro (D. E. PAINE).—The season is very backward. Pastures and mowings are in poor condition; fall seeding wintered well. The fruit bloom compares favorably with other years. Potato beetles are doing some damage. Spraying is very little practised. Farm help is plenty and most of it good help. Wages are from \$12 to \$15 per month with board and from \$30 to \$35 per month without. There are no marked changes in the acreage of the usual farm crops.

DUKES COUNTY.

West Tisbury (GEO. HUNT LUCE).—The season is a good average one. Mowings are looking well and pastures are in good average condition. There are very few, if any, insects doing damage at present. Spraying is practised to some extent. The supply of farm help is about equal to the demand. Wages are \$1.50 per day without board and from \$10 to \$30 per month with board. There are no marked changes in the acreage of farm crops; one new enterprise is hop growing, a few acres having been set out as an experiment.

BULLETIN OF MASSACHUSETTS BOARD OF AGRICULTURE.

SPRAYING OF CROPS FOR PROFIT.

By Prof. S. T. MAYNARD, *Pomologist to the Board.*

The longer any crop is grown in any one locality or the greater extent to which it is grown, the more will it be subject to injury by insect and fungous pests. It is often remarked that the number of insects and fungous pests is rapidly increasing, and this is too often true; so rapidly do they sometimes increase that our crops would be total failures did we not promptly apply remedial or preventative measures.

One season, under conditions favorable to their increase, insects and fungi are abundant, doing serious harm, while in another season the conditions are such that these pests are destroyed by cold, by too much moisture, by scant food supply, by parasites or other enemies, and little or no damage is done.

We sometimes have a series of years when insect and fungous pests are abundant and also those when no injury is done. In the first case we are liable to become discouraged, while in the second we are led to think that it is all a matter of chance and not worth while to make an attempt to protect our crops.

This is, however, an unthrifty method of doing business. Our crops may escape injury this season and possibly for one or two years longer, but there is scarcely a crop we grow that is not at one time or another injured by one or both of the above-named pests, and there are few, if any, crops that we grow upon which there is so much profit in growing that we can afford to lose even one crop. There is but one safe business principle for the farmer, fruit-grower or gardener to follow, and that is to be prepared with and apply preventative measures whenever the conditions are favorable for the development of insects and fungous pests.

MOST FARM AND GARDEN CROPS CAN BE SAVED BY SPRAYING.

There is hardly a farm or garden crop that cannot be saved from serious injury from insects or fungi, and that at a cost which will leave more margin for profit one year with another than if no spraying is done. The work of spraying will, of course, add something to the cost of any crop, but when one's crop is injured the same crop of other growers is in danger, and the majority of growers not being active and prompt in the work of prevention, the total crop of a section is likely to be small, which will ensure higher prices for those who do produce a perfect crop.

THE APPLE.

The apple crop can be saved from injury by the canker worm, a pest too well known to need description, the codling moth, the insect that causes the wormy apples, the tent caterpillar, the bud moth and many other insect pests, by spraying with Paris green, while the apple scab, a fungous growth that causes the olive-colored spots on the fruit and often causes the leaves to turn yellow and fall off, the cedar-apple fungus and other fungous pests may be destroyed by the use of the Bordeaux mixture, the two substances being combined and used at one application.*

* In Bulletin No. 60 of the Hatch Experiment Station, Amherst, Mass., may be found a full explanation of the different insecticides and fungicides, together with the routine for spraying all fruits, farm and garden crops. These bulletins are sent free to any one living in the State who requests them. This number should be preserved for future reference if it has already been received.

This has been proved by numerous careful experiments made at several of the experiment stations and by many progressive orchardists in various parts of the country.

THE PEAR.

The pear-tree psylla can be kept under control by the use of kerosene properly applied, as has been shown by the experiments made by Dr. Jabez Fisher of Fitchburg, and by the experiments made at the Cornell University and the Massachusetts experiment stations. The wormy fruit is prevented by the use of Paris green, and the leaf blight and cracking of the fruit by the use of the Bordeaux mixture and copper sulphate solution.

THE PLUM.

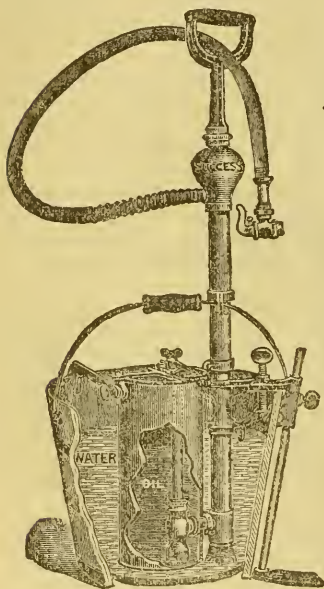


FIG. 6.

The fruit of the plum may be largely saved from injury by the plum curculio by the use of Paris green, and the injury to the tree by the black-knot and the leaf blight (Fig. 1 illustrates a plum tree sprayed and Fig. 2 one of the same variety unsprayed), and to the fruit by the monilia or brown-rot may be prevented by the use of the Bordeaux mixture and the copper sulphate solution. The large crops of plums that are borne on the trees in the Hatch Experiment Station orchards, some trees of which are over thirty years old, is proof of this assertion. The aphides that have been so destructive to the plum in the past two seasons can be destroyed by the use of the kerosene emulsion or kerosene and water. A pump for the use of kerosene and water is shown in Fig. 6. The Japanese plum trees cannot be sprayed with Paris green after the foliage has opened, and, if an arsenate is necessary for the destruction of chewing insects, arsenate of lead must be used.

THE PEACH.

This fruit while not so much benefited by spraying as some of the other fruits, may be sprayed with the Bordeaux mixture to prevent the leaf curl, the shot-hole fungus and the rotting of the fruit. Paris green cannot be used on the peach, but the arsenate of lead may be used for the destruction of the plum curculio. The peach aphid, which causes the leaves to curl up during the summer, may be destroyed by the use of kerosene emulsion or kerosene and water.

THE CHERRY.

The cherry aphid, the minute black insect that causes the leaves to curl and stops growth, can be kept from doing serious injury by the use of the kerosene emulsion or kerosene and water, or by cutting off a few leaves on the ends of the growing branches. The rotting of the fruit just as it begins to ripen may be prevented by spraying after every rain for a week or two about the time the fruit is ripening with the copper sulphate solution 4 ounces to 50 gallons. The cost of this work at first would seem to be more than an ordinary crop would be worth, but the



Fig. 1.—PLUM TREE SPRAYED.



Fig. 2.— PLUM TREE UNSPRAYED.

liquid is inexpensive, costing only from one to two cents per barrel besides the labor of application, and with proper appliances and economy of labor the spraying can be done for a very small sum per tree for the short time when it is necessary to spray. Mr. Geo. S. Powell of Ghent, N. Y., is reported to have saved a large crop of cherries during the summer of 1898, a season of unusual rainfalls, by the above treatment. Paris green cannot be safely used on the cherry foliage.

THE QUINCE.

The leaf blight and rust on the branches and fruit can be destroyed by the use of the Bordeaux mixture. This should not be applied, however, after the fruit is more than one-half grown.

THE GRAPE.

The insects attacking the grape, except the phylloxera which seldom injures the American grape, can be destroyed by the use of Paris green, and the black rot, the downy and powdery mildew and the anthracnose are all prevented from doing harm by the use of the Bordeaux mixture and the copper sulphate solution. The former should never be used after the berries are one-half grown. One of the greatest difficulties in growing the grape in New England is the weakening of the vines by the fungous pests, and vines regularly sprayed to prevent this injury gain in strength from year to year and large and satisfactory crops are the result. We have to compete with fruit from the large vineyards of more favorable grape growing sections than New England, but the native fruit when well grown and ripened can be put upon our local market in so much better condition than that coming from a long distance, that it is sure to bring a much higher price. Fig. 3 illustrates a sprayed and Fig. 4 an unsprayed vine.

THE RASPBERRY AND BLACKBERRY.

The orange rust and leaf blight, the two most serious obstacles to the growth of these crops, are easily kept under control by spraying with the Bordeaux mixture.

THE CURRANT AND GOOSEBERRY.

The currant worm is destroyed by the use of hellebore powder applied in water or in a dust form when the leaves are wet with dew or rain. Attention should be given to the bushes very soon after the leaves open and spraying be done upon the first appearance of the worms. The leaf blight, a fungus that causes the leaves to fall off in August, may be prevented from doing injury by the use of the Bordeaux mixture.

THE STRAWBERRY.

While spraying for the destruction of insects and fungous pests attacking this fruit does not give so marked results as with many other crops, it has been conclusively shown in many experiments that the rust is largely reduced by the use of the Bordeaux mixture, and the two insects, the black paria and the crown borer, may be largely prevented from doing serious harm if Paris green is used in the mixture.

THE POTATO.

Numerous experiments and general practice go to show that this crop cannot be grown with the best results without the use of insecticides and fungicides. The Colorado beetle and the flea beetle are destroyed by the use of the Bordeaux mixture and Paris green, and at the same time the leaf blight and the potato rot fungus may be largely, if not entirely, prevented. The growth of the potato scab on the tuber can be largely prevented by the use of corrosive sublimate or sulphur.

THE TOMATO.

The injury to the tomato crop from the rotting of the fruit and the blight of the leaves can be largely prevented by the use of the Bordeaux mixture.

CELERY.

While the success of this crop depends largely upon an exceedingly rich soil and an abundance of moisture, the numerous fungous pests that often injure the crop under many conditions may be kept down by the frequent use of the Bordeaux mixture. The plants should be sprayed in the seed bed as well as in the field in order to insure the best results.

OTHER CROPS.

The onion rust, grain rust and smut, asparagus rust and many blights, rusts, mildews, smuts, etc., that attack other crops, and the many insect pests may also be kept under control by spraying, and no thrifty cultivator can afford not to insure his crops at least to the extent of equipping himself with apparatus for the application of insecticides and fungicides and to have on hand the materials necessary for their use, and also one or more of the numerous spraying calendars issued by some experiment station or printed in the agricultural papers.

EQUIPMENT FOR SPRAYING.

Perhaps the reason why so few are making use of insecticides and fungicides to protect their crops is from the idea that it requires especial skill and expensive apparatus to properly spray their crops. Spraying is one of those operations, however, that is simple enough in itself, materials are generally easily obtained, and directions for the work are spread broadcast throughout the land, and the work looks larger, perhaps, than it really is. With a good pump, good nozzles and a fair degree of intelligence and mechanical skill, the operation is neither difficult nor expensive. There are many good pumps and nozzles to be had at reasonable prices, any one of which will be a good investment to the farmer, fruit grower, or gardener. We cannot advocate any one pump as superior to all others. All pumps of whatever kinds in which copper sulphate is used must be made of brass as iron would be soon so corroded as to be worthless.

KINDS OF PUMPS.

The pumps in most general use may be put in four groups: (1) The hand pump, either the syringe or pail pump or atomizer (Figs. 5 and 6). (2) The knapsack (Fig. 7). (3) The barrel pump (Figs. 8 and 9), and (4) the machine pump.*

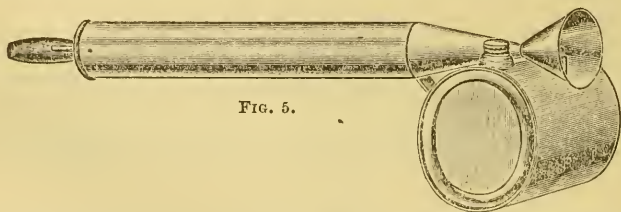


FIG. 5.

The Hand Pumps.—For garden work where only a few plants, shrubs or small trees are to be protected, the common hand pump represented by Fig. 6 (without the kerosene attachment) will be found sufficient.

* EDITOR'S NOTE.—Attention is called to the article "Improvements in Spraying Machinery" included in the report of the Gypsy Moth Committee of this Board, and to be found on pages 469-474 of "Agriculture of Massachusetts" for 1898.



Fig. 3. — VINE SPRAYED.

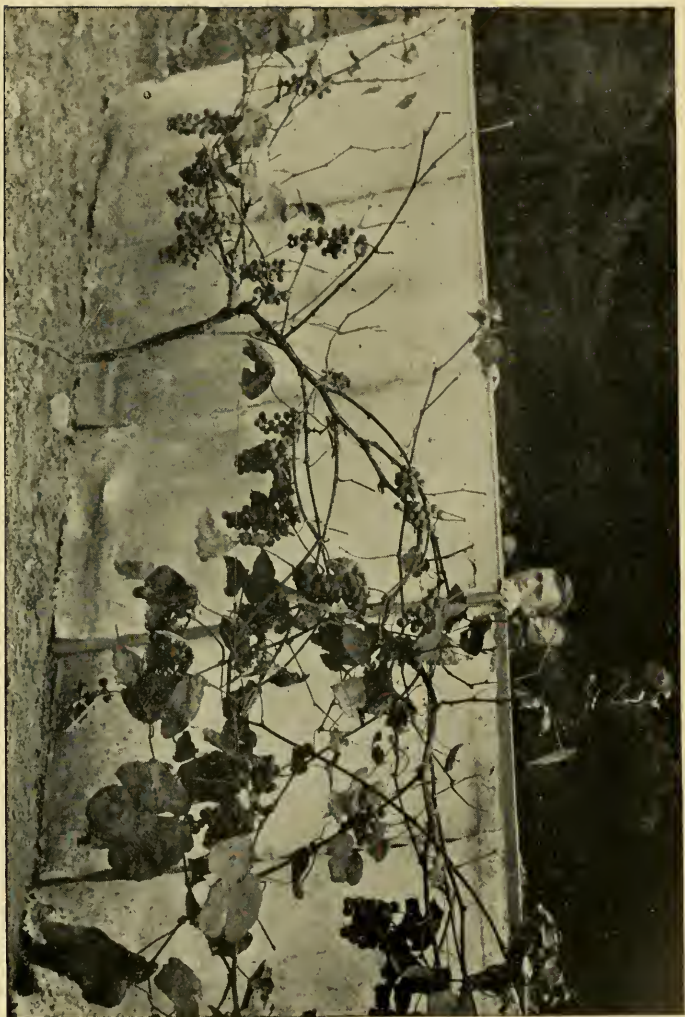


Fig. 4. — VINE UNSPRAYED.

The atomizer, Fig. 5, of which there are many forms that are practically the same in construction and utility, is very useful and inexpensive. For the use of the Bordeaux mixture or copper sulphate solution, it must be made of brass.

The knapsack, Fig. 7, is useful when a larger amount of shrubs or small trees are to be treated and when they are too closely planted to allow the barrel pump to be driven through on wheels or on a stone boat. These pumps hold about five gallons and can be easily carried on the back. The main objection to them is the cost which is from \$12 to \$18, complete, with hose and nozzles.

The Barrel Pump. — This is by far the most economical and satisfactory kind of a pump for general use. The pumps are mounted either on the side or end of the barrel, Figs. 8 and 9, — we prefer the former because the barrel can be more easily kept in place on the stone boat or in the cart.

It is carried about in a cart or wagon on a stone boat or on a single pair of wheels, and with a piece of half-inch iron or brass pipe the tops of the highest fruit trees may be reached with the spray. If tall, ornamental trees are to be sprayed the hose must be carried up into the branches and the spraying be done from there.

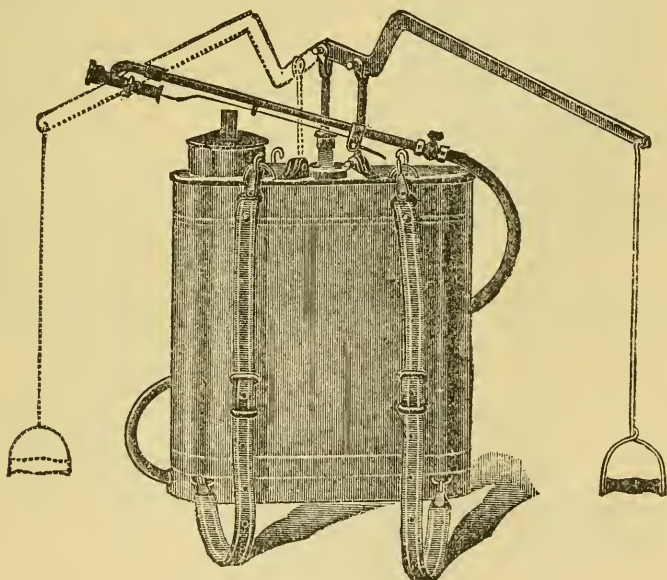


FIG. 7.

A kerosene attachment is provided on many of the barrel pumps, by which kerosene and water are forced into the hose at the same time and distributed from the nozzle in a fine mist or spray. As far as has been tested this seems the best method of applying kerosene. In Fig. 6 is shown a kerosene attachment to the pail pump. When but a small amount of spraying with kerosene is to be done and only low shrubs or plants, the atomizer, Fig. 5, will do the work as effectually as the more expensive appliances.

Machine Pumps. — For the varied work of the average New England farmer or horticulturist, these pumps cannot be used as economically as the barrel pump, but where large areas of potatoes, vineyards and young orchards are to be sprayed, their use may be made profitable. The same may be said to a greater degree of the steam sprayers.

Nozzles.— Much of the success in spraying depends upon the kind of nozzle that is used. Fig. 10 illustrates the Vermorel nozzle, and Fig. 11,

the Bordeaux nozzle, both of which throw the liquid out in a very fine spray. In using these nozzles, all coarse particles of lime or other substances must be strained out of the liquid.

Insecticides.— Insecticides or insect destroyers may be divided into two groups, *i.e.*, (1), those that kill chewing insects, like the potato beetle and its larvæ, the larvæ of the canker worm, etc., and (2), those that kill sucking insects, like the aphides (plant lice), the pear psylla, the black squash bug, etc.

In the first group are Paris green, London purple, arsenate of lead and hellebore.

Paris Green.— This is the most generally known and one of the most effective insecticides. It is used in a solution of 2 lbs. to 150 gallons of water, or in a dry powdered form with bellows or guns, and in this form must be applied when the foliage is more or less wet with dew or rain. If used too abundantly and the weather following is very wet, serious injury often follows. Numerous substitutes for this insecti-



FIG. 8.

cide have been offered in the market under various names but none of them have proved of sufficient value to be recommended.

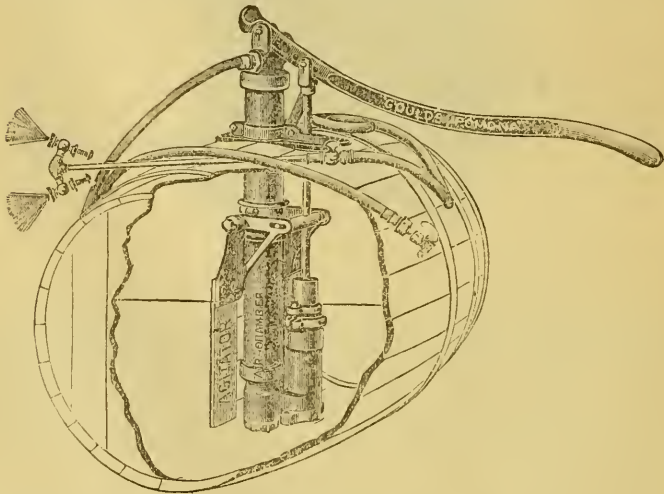


FIG. 9.

¶ *London Purple.*— Owing to the variable nature of this substance it has not come into such general use as has Paris green. Upon crops that are

not injured by the soluble arsenious acid it contains, it may be safely used.

Arsenate of Lead. — The peach, Japanese plum and the cherry foliage are injured by the use of Paris green, but the arsenate of lead is said to be equally as effective as the latter and not injurious to the foliage, even when used in large quantities.

Kerosene. — Up to within a year or two, this insecticide has been used in the form of kerosene emulsion and with good results, but some difficulty seems to have been experienced in making a reliable emulsion under various conditions, and injury has often resulted. It has been found, however, that clear kerosene or kerosene and water applied in a fine spray or mist, and on *bright, airy days* is safe and more effectual and not more expensive, when the labor of making the emulsion is considered. Neither the emulsion nor the kerosene and water should be applied in moist, cloudy weather.

Pyrethrum. — This powder, called also Persian or Dalmation insect powder, is an insecticide that acts very quickly upon the breathing organs, killing delicate insects like the cabbage worm, currant worm, etc. If applied just at night it is much more effective than when applied in the morning, especially if the weather be bright and airy.



FIG. 10.

FUNGICIDES.

Fungicides or fungi destroyers, are substances that prevent the growth of the spores or seeds of the various lower plants, the rusts, blights, smuts, mildews, etc., called fungi, that feed upon and destroy our farm and garden crops.

The most important of these is copper sulphate or blue vitriol, sometimes called blue stone. A fungous plant growing within another plant and taking its nourishment from that plant, as most of the fungi do grow, cannot be destroyed without destroying the host plant, — but its spores or seeds will be destroyed if they come in contact with even a very small amount of soluble copper. The main object therefore in the use of copper solutions is to have the substance spread over the surface of the foliage or branches so that the spores which are floating in the air may be destroyed when they fall upon a tree or plant that is in condition to allow of their growth.

Copper sulphate is used in two forms, *i.e.*, the Bordeaux mixture and copper sulphate solution.

Bordeaux Mixture. — Full directions for making and using all insecticides and fungicides are given in Bulletin No. 60 of the Hatch Experiment Station already referred to and need not be repeated here. Should any reader of this paper not have received this bulletin it can be obtained by sending a postal to H. H. Goodell, Director, Amherst, Mass. The Bordeaux mixture is the fungicide most universally employed upon all crops when the disfigurement of the foliage or fruit is of no consequence, and is especially valuable because of the long time that it will adhere to the foliage and gradually give out enough of the copper solution with each rain to kill all ordinary spores.

Copper Sulphate Solution. — This is used while the trees are dormant, 1 lb. to 25 gallons of water, and when the foliage is upon the trees or



FIG. 11.

plants at $\frac{1}{4}$ lb. to 50 gallons of water. In this form the copper is very soluble, quickly washed off by heavy rains, and it is therefore necessary to spray after every heavy rain.

CONDITIONS OF SUCCESS.

The secrets of success in this work are (1) in the ability of the operator to fully understand his machines or pumps and keep them in good working order at all times; (2) to understand the preparation of the insecticides and fungicides and the economy of time in getting them ready for use; and (3) in the thorough and rapid application at just the right time.

MASSACHUSETTS
CROP REPORT

FOR THE

MONTH OF JUNE, 1899.

ISSUED BY

WM. R. SESSIONS,
SECRETARY STATE BOARD OF AGRICULTURE.

BOSTON:
WRIGHT & POTTER PRINTING CO., STATE PRINTERS,
18 POST OFFICE SQUARE.
1899.

CROP REPORT FOR THE MONTH OF JUNE, 1899.

OFFICE OF STATE BOARD OF AGRICULTURE,
BOSTON, MASS., July 1, 1899.

Bulletin No. 2, Crop Report for the month of June, is herewith presented. We desire to call the attention of our readers to the article at the close of the bulletin, on "Suggestions for the use of barnyard manure," by Chas. Wellington, Ph.D., professor of chemistry at the Massachusetts Agricultural College.

PROGRESS OF THE SEASON.

The June returns of the United States Department of Agriculture (Crop Circular for June, 1899) indicate a reduction of about 470,000 acres, or 2.5 per cent, in the area of spring wheat sown. In consequence of the partial failure of the winter wheat crop, there has been a disposition to increase the acreage of spring wheat, but the season has been so unfavorable as to bring about a contrary result. The average condition of spring wheat is 91.4, as compared with 100.9 last year, 89.6 in 1897, and 93.2, the mean of the June averages of the last thirteen years. The average condition of winter wheat is 67.3, as compared with 90.8 last year, 78.5 in 1897, and 83.4, the mean of the June averages of the last thirteen years.

The total reported acreage of oats is about 169,000 acres, or seven-tenths of 1 per cent, less than last year. The average condition of oats is 88.7, as compared with 98 last year, 89 in 1897, and 91.2, the mean of the June averages of the last thirteen years.

The acreage reported as under barley shows an increase of 3.1 per cent over last year. The average condition of barley is 91.4, as compared with 78.8 last year, 87.4 in 1897, and 89.6, the mean of the June averages of the last

thirteen years. In almost every State in which the production of barley constitutes an important branch of the agricultural industry the condition on June 1 was highly favorable.

The acreage under rye shows a decrease of 8.9 per cent. The average condition of rye is 84.5, as compared with 97.1 last year, 89.9 in 1897, and 91.3, the mean of the June averages of the last thirteen years. The condition is below the average in all the important rye-producing States except New York.

The reports on cotton planting indicate a reduction of about 8 per cent in the area planted. The acreage planted was not only less than last year, but there has also been some ploughing up of land where the seed failed to germinate. The average condition of cotton was 85.7, against 89 last year, and 88.1, the mean of the June averages of the last thirteen years.

In Louisiana, the principal rice-producing State, there is an increase of at least 7 per cent in the acreage, and in every other State except Alabama and Mississippi there is also some increase. The condition in Louisiana is 8 per cent below the June average of the last five years, but elsewhere it is above the average.

The peach crop will probably come as near being a total failure as it ever will come in a country of such vast extent and such varied climatic conditions as the United States. With the exception of California, where the conditions indicate from 75 to 95 per cent of a full crop, there is not a State that has the promise of as much as two-thirds of a normal crop; few look for even half a crop, and in many important peach-growing States there will be practically no crop whatever.

There are but few States in which the condition of spring pasture is not manifestly below the average of a series of years.

From eighteen States and Territories an increase, and from thirty a decrease, is reported in the acreage of clover. The condition of clover is below the average, except in Idaho, where it is the same, and in Maine, Georgia, Kentucky and Nebraska, where it is 3, 2, 3 and 6 points above.

In Massachusetts the acreage of rye as compared with last year is given as 96, and the average condition June 1 as 88; the acreage of oats as 98, and the condition as 86; the acreage of barley as 99, and the condition as 94; the acreage of clover as 98, and the condition as 82; the average condition of spring pasture as 78; the average condition of apples as 62, and of peaches as 15.

TEMPERATURE AND RAINFALL FOR THE WHOLE COUNTRY.

[FROM UNITED STATES CLIMATE AND CROP BULLETINS.]

Week ending May 29. — The week was cooler than usual on the Pacific coast, in the Rocky Mountain districts, along the south shore of Lake Superior and in the States bordering on the Atlantic. In the central valleys, west Gulf States and over the greater part of the Lake region the week was warmer than usual. The maximum temperatures of the week were not unusually high, but the minimum temperatures on the 25th in California and in the middle Atlantic States were decidedly low. There was more than the usual amount of rainfall during the week over the greater part of the upper Lake region and upper Mississippi valley, over the central portions of Kansas and Nebraska and local areas elsewhere. In the lower Missouri valley and from the central Mississippi valley eastward, including all districts northward of the Carolinas, the rainfall was much below the average. The week was not generally favorable to the growth of corn. The general condition of winter wheat was probably less favorable than the previous week, but the week was highly favorable to spring wheat. The absence of rain made the week unfavorable to transplanting tobacco.

Week ending June 5. — The week was warmer than usual in all districts east of the Rocky Mountains, being decidedly warm in the central valleys, Lake region, New England and the middle Atlantic States. The temperature extremes of the week were not abnormal, as a rule. There was an exceptionally heavy fall of rain, for this season, throughout the Pacific coast districts and the central Rocky Mountain region. Very heavy rains fell in the upper Missouri valley and over portions of the upper Mississippi valley. A large part of

the southern States and New England received no appreciable amount, and there was a marked deficiency in the northern portion of the middle Atlantic States, portions of the Lake region, central Mississippi and lower Missouri valleys. In New England, New Jersey, New Mexico and over the greater part of the southern States drought generally prevailed. In the principal corn States the conditions were more favorable than in the preceding week. Harvesting winter wheat was quite generally in progress in the southern States, and oat harvest continued with light yields.

Week ending June 12. — The week was cooler than usual along the immediate coast of California, in Washington, and in Idaho and northern Nevada eastward to and including the Dakotas, Nebraska, Kansas and Oklahoma. The week was warmer than usual throughout the Mississippi valley and in all districts to the eastward, and was exceptionally warm over the middle Atlantic States, southern New England, portions of California, the Lake region, Ohio valley and south Atlantic States. Very heavy rains fell in the lower Missouri and Ohio valleys, over portions of the upper Mississippi and Red River valleys and on the central Gulf coast. Less than the usual amount fell in New England, over the greater part of the Lake region, and over portions of the southern States. The seasonal rainfall from March 1 to date was much below the average in New England. Rains in the southern States largely relieved the drought, but it still continued in New England, and portions of New Jersey, Nebraska, Colorado and New Mexico. In the central valleys corn made good growth. Winter wheat was being harvested as far north as the Ohio and central Mississippi valleys, but the reports as to spring wheat were less favorable than in the previous week. Haying was in general progress in the central valleys, the middle Atlantic States, Oregon and California.

Week ending June 19. — The week averaged slightly warmer than usual over portions of the Lake region, New England and middle Atlantic States and on the east Gulf coast. The week was decidedly warm over the western portion of the plateau region and in Washington, Oregon and California. Generally throughout the central valleys and Gulf States the week averaged cooler than usual. Portions

of the Lake region, middle and south Atlantic States received more than the usual amount of rain, but the fall was less than average over the greater part of the country east of the Mississippi. There was also less than the usual rainfall in the upper and lower portions of the Missouri valley. Practically no rain fell on the Pacific coast. The week as a whole was very favorable to agricultural interests, though drought continues over portions of New England and the middle Atlantic States. Corn made good progress in all districts, and winter wheat harvest continued under favorable conditions. Haying continued with light yields in the middle Atlantic States, and in New England the hay crop appeared nearly a failure.

SPECIAL TELEGRAPHIC REPORTS.

[WEATHER BUREAU, BOSTON.]

Week ending May 29. — New England. Boston: Continued dry weather very detrimental to vegetation; not enough moisture to sprout small seeds; hay crop seriously damaged, cannot probably recover even under favorable conditions; corn and potatoes coming up unevenly, much corn replanted; tobacco injured by drought.

Week ending June 5. — New England. Boston: Intensely warm week; practically no rainfall; protracted drought causes much alarm; everything at standstill; serious crop shortage inevitable unless relief comes speedily; corn and grass suffering severely, latter probably beyond recovery.

Week ending June 12. — New England. Boston: Local showers on 7th, no material benefit; drought continues unabated, outlook very discouraging; grass considered beyond recovery; haying begun, to save partial crop; oats poor; rye filling well; corn growing favorably in northern sections, but slow in southern.

Week ending June 19. — New England. Boston: Drought somewhat mitigated by heavy showers, except in extreme southern sections; rainfall too late to save hay crop, which is nearly a failure; garden crops poor, much replanting necessary; corn doing fairly well; very little fruit promised; tobacco outlook generally favorable.

THE WEATHER OF JUNE, 1899.

The month of June presented meteorological conditions which were considerably at variance with established normals. Among the chief features may be mentioned the extreme heat and absence of precipitation of the first part of the month, and the occurrence of severe electrical disturbances during the last decade.

The temperature has been decidedly above the normal, averaging a daily departure of about 5° plus. The principal periods of warmth were the 5th to 7th, inclusive, 12th to 14th, inclusive, 19th and 20th. Various other days during the month gave more than the usual amount of heat. The 6th, with a mean temperature of 80° to 85° , was the warmest day, while the 14th, with a mean of about 80° , was also very warm. The greatest daily range in temperature occurred on the 8th, when the mercury rose, from a minimum of 45° to 55° , to a maximum of 90° and over. The accumulation of heat since the 1st of January now amounts to about 275° , the month of June having added more than 125° to this accumulated excess.

During the first half of the month the rainfall was extremely light, the total fall at Boston being less than .9 inch, as against a normal amount of about 1.75 inches. During the latter half of the month precipitation occurred more frequently and in much greater amounts, mostly in the form of thunderstorms. On the 15th severe storms of wind, rain, hail and lightning passed over the State and were felt at many places. At Leeds 2.87 inches of rain fell in one storm, 2.04 inches of this falling in 30 minutes. At Winchendon 1.40 inches fell in 20 minutes, and the total was 1.98 inches. East Templeton reported 2.05 inches; Fitchburg, 1.07 inches; New Salem, 1.32 inches; and Hyannis, 1.74 inches. The bulk of the rainfall was deposited in the central and western portions of the State, and, while some damage was caused to fruit trees and some fields were "washed" badly, the beneficial effects of the rain more than compensated for the damage. The 21st again witnessed heavy storms, locally, throughout the State. Several buildings were struck by lightning and burned, and some live stock

was killed. By far the most serious of the local storms of the month were those which occurred on the 24th, accompanied by falls of hail, the like of which, as some reports assert, were never before known. In the western part of the State hailstones fell which measured fully eight inches in circumference and weighed three ounces. Thousands of panes of window glass were destroyed, fruit was beaten from the trees, buildings in many places were struck and several persons killed by lightning. Reliable reports indicate that these storms were almost unprecedented, but so far as can be learned no evidences of tornadic formation were observed.

The month has certainly been prolific in unusual happenings, having begun with a disastrous drought extending over from the preceding month, and having broken the dry spell in a manner which will undoubtedly leave a vivid impression.

In the circular to correspondents, returnable June 22, the following questions were asked:—

1. What insects are proving injurious in your locality?
2. How is Indian corn looking, and what is the acreage as compared with previous years?
3. Has haying begun, and what is the prospect for the crop?
4. How does the acreage of early potatoes compare with previous years, and what is the promise for the crop?
5. How do early market-garden crops compare in yield and price with former years, and what is the prospect for those not yet harvested?
6. How do the quantity and price of dairy products and the supply and price of dairy cows compare with former years?
7. What is the condition of pasturage in your locality?
8. What is the outlook for such fruits and berries as are grown for market, naming them?

Returns have been received from 162 correspondents, and from them the following summary has been made up.*

INSECTS.

The season appears to have been unusually free from damage from insects thus far, many correspondents reporting

* Since this summary was written general rains have fallen, to the great benefit of all growing crops.

little or no injury from this cause. The potato beetle is, as usual, the insect most commonly spoken of, but it does not appear to be doing even the usual amount of damage. Canker worms come second, and other insects mentioned are cut worms, tent caterpillars, currant worms, rose bugs, cabbage maggots, horn flies, wire worms, plant lice, spittle insects, elm leaf beetles, asparagus beetles, brown-tail moths, curculios, grasshoppers, and cranberry vine and fire worms.

INDIAN CORN.

Indian corn has generally done very well, considering the long-continued drought, and is now in fair condition. There are many complaints, however, of its being backward and uneven, and also of a poor stand, the latter defect being caused by failure to germinate, owing to dry weather. The acreage appears, on the whole, to be about the same as usual. With plenty of moisture the promise for the crop appears to be good.

THE HAY CROP.

At the time of making returns, haying was just commencing in many localities, and at date of issue should be well along in all sections. The crop is generally very light, few speaking of it as even a fair crop. The most popular estimate appears to be "not over half a crop." Much hay on light land has dried badly in the field, and the quality of the crop as a whole must necessarily be somewhat off. Grass roots are also reported as injured by drought in many cases, and much rain is needed to put mowings in shape for next year.

EARLY POTATOES.

The returns indicate an increase in the acreage of early potatoes. Reports generally are that the vines are looking remarkably well, considering the prolonged drought, with a fair prospect for the crop.

MARKET-GARDEN CROPS.

Early market-garden crops were much shortened by drought, with prices generally showing an increase. The

later crops have also suffered from lack of moisture, and do not now promise as well as usual at this time. Plentiful rains in the future may bring them more nearly to the normal, but it is very doubtful if the injury can be entirely overcome.

DAIRY PRODUCTS.

The supply of dairy products runs about as usual thus far, though some cases of shrinkage in milk, because of short feed, are reported. The downward trend in prices for dairy products appears to be arrested for this season, but nothing like permanent improvement shows itself. Good dairy cows are rather scarce in proportion to the demand, as has been the case for several years, and still command good prices, as a rule. The shortage of the hay crop will, however, tend to prevent most farmers from increasing their herds.

PASTURAGE.

The long-continued drought of the last three months has been very hard on pastures, and many complaints are made that they have dried up or are drying up. Abundant rainfall in the future may carry them through the season in most localities, but any future deficiency will inevitably result in a shortage of pasturage.

FRUIT AND BERRIES.

Strawberries suffered exceedingly from the dry weather, and probably are not more than half a crop for the State as a whole, though there are some reports of good yields. Prices are much better than last year, however, and the half crop of this year will probably exceed the phenomenal crop of last year in money value to the grower. Raspberries and blackberries set well, and with rain should generally yield well. Currants are generally rather off. Apples did not generally set well and have also dropped badly, hence the prospect is not encouraging. Cherries have done well. Pears appear a little off and plums not nearly up to the average. Peaches are practically a failure, and many trees will not recover from the effects of the severe winter.

NOTES OF CORRESPONDENTS.

(Returned to us June 22.)

BERKSHIRE COUNTY.

Otis (S. H. NORTON). — Insects are doing very little damage. Corn is very uneven and backward, with about the usual acreage planted. Haying has not begun, and the prospect is for a light crop. There are few early potatoes raised. Dairy products are about average in quantity and price; dairy cows high. Pastures are not as good as last year, but are in fair condition.

West Stockbridge (WM. C. SPAULDING). — Tent caterpillars, cut worms and rose bugs are doing some damage. Indian corn is looking well, with acreage about as in former years. Haying has not begun, and the crop will be light. The acreage of early potatoes is about as usual, and the crop looks well now. The quantity and price of dairy products are about as usual. Pasturage is in fair condition, but is in need of rain. Strawberries are a very good crop.

Washington (E. H. EAMES). — Potato bugs are doing some damage. Indian corn is about the same as last year. Haying has not begun, and the crop is little above half a crop. Potatoes are very backward, owing to drought. Prices of dairy products are about the same as last year. Pastures are very poor and dry.

Dalton (W. B. BARTON). — Tent caterpillars are doing some damage. Indian corn is in good condition, with about the usual acreage. Haying has not begun, and the prospect is that there will not be more than half a crop. The acreage of early potatoes is about the same as usual, but it is too dry for a full crop. Prices of dairy products are about the same as last year, and dairy cows are plenty. Pasturage is in poor condition. The drought has cut off the berries and cherries, and apples are falling badly.

Hancock (C. H. WELLS). — Currant worms, tent caterpillars and horse flies are proving troublesome. The seed on many corn fields did not germinate until after the recent rain, and they look very uneven; acreage about the same as usual. Haying has not

yet begun. Butter is about the same as last year in price; cows are not in as much demand, and prices are lower. Pasturage is short, on account of the long dry weather. Strawberries are almost a failure, from lack of rain; no plums, and but few cherries.

Savoy (W. W. BURNETT). — Potato bugs are doing some damage. Corn is doing fairly well where it came up well; acreage nearly double usual amount. Haying has not commenced, and the prospect is for a very light crop. The acreage of early potatoes is about an average, but on the whole they look rather slim. The outlook for late market-garden crops is rather unpromising. There is a full average quantity of dairy products, but the price is a little off. Pastures are short and dry. The outlook is unpromising for all varieties of fruit and vegetables.

Williamstown (S. A. HICKOX). — Corn looks well, with about the usual acreage. Haying has begun with half a crop. There is the usual acreage of early potatoes, but the prospect for the crop is poor. Early market-garden crops are less than half the usual yield, prices higher, and prospect poor for later ones. The quantity of dairy products is less than usual, price same; cows less in price. Pastures are in poor condition. The outlook is poor for all kinds of fruits and berries.

FRANKLIN COUNTY.

Heath (O. D. CANEDY). — Potato bugs are doing some damage. There is a rather increased acreage of Indian corn, but the crop is small and backward. Haying has commenced, and the crop is very light. More than the usual acreage of early potatoes was planted, and they are looking fairly well. Cows are high, but butter and milk bring about the same as usual. Pastures are a little short. The apple crop will be very light.

Charlemont (S. W. HAWKES). — There are not as many insects as usual. Corn is generally looking well, though a little late; acreage about the same as usual. Haying has begun, with not over half a crop. More early potatoes than usual were put in, and they are looking well, but if the dry weather continues they will make a light yield. The quantity of dairy products is larger than usual, price about the same; dairy cows are high. Pastures are very dry. Apples promise only a small crop.

Colrain (A. A. SMITH). — Potato bugs are doing some damage. Indian corn is looking well, with about the usual acreage. Haying has begun, with about half a crop. The acreage of early potatoes is about the same as usual, with prospects for the crop poor.

Early market-garden crops made a poor yield. Dairy products are lower in price and smaller in quantity than usual. Pasturage is in very poor condition. Fruits and berries were injured by the drought.

Ashfield (CHAS. HOWES). — But little damage is being done by insects. Corn is backward, owing to the dry weather; acreage somewhat increased. But little hay is cut as yet, and the crop will be light. The usual acreage of early potatoes was put in, but unless rain comes soon they must be light. Cows are beginning to shrink in milk earlier than usual; prices for cream and butter a little higher than last year. Feed is short in many pastures. Fruits and berries of all kinds will be light, and in some localities they are a failure.

Deerfield (CHAS. JONES). — Potato bugs are doing some damage. Indian corn is looking well. Haying has not yet begun, but the crop will be light. The acreage of early potatoes is about the same as usual, and a fair crop is promised. Early market-garden crops are hardly up to the average. Quantity and price of dairy products about the same as last year; cows higher than in former years. Pasturage is in poor condition. The prospect for strawberries and raspberries is not very good.

Sunderland (J. M. J. LEGATE). — Cut worms and potato bugs are doing some damage. Corn is looking very well, with a slightly increased acreage. Haying has not begun, and there will not be half a crop. There is a large increase in the acreage of early potatoes, and the vines are looking well. There is a light yield of early market-garden crops, with a slight increase in price; rain is needed for those not yet harvested. Pasturage is very short. Apples blossomed full, but are dropping badly; no peaches or plums; strawberries not half a crop; raspberries blossomed well.

Wendell (N. D. PLUMB). — Potato bugs are doing much damage. Corn is looking well, and the acreage is increased fully one-fourth. No haying has been done as yet, and there will not be over one-third of a crop. Late potatoes are looking well. Early market-garden crops are very backward, on account of lack of rain. Dairy products are normal in yield and price; good cows are very high. Pastures are the poorest for years; feed short and springs drying up. There will be very little fruit this year.

HAMPSHIRE COUNTY.

Belchertown (H. C. WEST). — No insects are doing damage. Corn is a little late and very uneven, but is growing fast; acreage 25 per cent above the average. Very little haying has been done,

and the prospect is for a small crop. There is a full average acreage of early potatoes, and they are looking finely. Dairy products are fully up to the average in quantity, and price a little off. Pastures are short. Strawberries are a short crop, blackberries better; all fruits decidedly short.

Granby (W. S. CLARK).—Considerable corn failed to germinate, and necessitated replanting; acreage normal, crop a little backward. Haying has begun, with less than an average crop. There is the usual acreage of early potatoes, and they are looking fairly well. The drought has injured the yield of market-garden crops; prices good. Quantity of dairy products less than usual, but prices about the same; milch cows short in supply and high in price. Feed is very short in pastures.

Amherst (WM. P. BROOKS).—Indian corn is backward, with about the usual acreage. Haying has not yet generally commenced; crop about three-fourths average on college farm. There is about the usual acreage of early potatoes, and the crop looks well. Peas and beets are doing well, both as to yield and price. The quantity of dairy products is about average, as is also the price; dairy cows rather high. Pasturage is in fair condition. Strawberries are a small crop; cherries good; currants and gooseberries good; blackberries and raspberries much injured by winter-killing; apples promise a good crop; no peaches.

Southampton (C. B. LYMAN).—Indian corn is looking well, with a full average acreage. Haying has begun, but the crop will hardly be two-thirds of the average. There is the usual acreage of early potatoes, but they are not first class, from want of moisture. Early market-garden crops rather light, with prices fair; the recent rains have improved the prospect for later ones. Dairy products a little off in quantity, price fully up to the average; price of dairy cows a little better than formerly. Pastures are short and dry. The prospect is not flattering for any of the various fruits and berries.

Chesterfield (HORATIO BISBEE).—No insects are doing much damage at present. Corn is looking poorly, but the acreage is much larger than usual. Haying has not begun, and the prospect is very poor for the crop. The acreage of early potatoes is about as common, and they are looking well. The quantity of dairy products is about as usual, price a little above; dairy cows not plenty, and price well up. Pasturage is in poor condition. Fruits and berries are not much grown.

Middlefield (J. T. BRYAN).—Insects are doing little damage. Corn is looking well, with an increased acreage. The outlook is that hay will be but about half a crop. There is about the usual

acreage of early potatoes, but they are suffering from the drought. Garden crops are looking fairly well. The price of dairy products is keeping up well, with increased production; cows are lower than for some years. Pastures are short, but stock is doing well. Berries will be abundant, but the outlook for fruit is not encouraging.

HAMPDEN COUNTY.

Tolland (E. M. MOORE). — Potato bugs are doing considerable damage. Indian corn is very backward, on account of dry weather; about the usual acreage planted. A few have commenced haying, with the prospect of getting from one-half to two-thirds the usual crop. There is no marked change in the acreage of early potatoes, but they are ten days later than usual. There is not much market-gardening done in this vicinity. Feed is short and pastures pretty thoroughly dried up.

Russell (E. D. PARKS). — Tent caterpillars and currant worms are doing some damage. Indian corn is backward, with acreage about as usual. Haying is just commencing, with the prospect of half a crop. The acreage of early potatoes is the same as usual, and they are doing well, considering the very dry weather. Dairy products are fully as high as usual, and prices of dairy cows also keep up. Pastures are in very poor condition, but the recent showers will improve them somewhat. Strawberries have been a good crop; other fruit makes a very poor showing now.

West Springfield (T. A. ROGERS). — Potato bugs and horn flies are proving troublesome. Indian corn is looking well, with about the average acreage. Very little hay has been cut as yet, with hardly more than half a crop in prospect. The acreage of early potatoes is fully up to the average, and they are generally looking well. Early market-garden crops suffered from drought, late ones looking better. Dairy products plenty up to the present time, some signs of shortage now, price down; dairy cows 10 per cent off in price. Pasturage is very short indeed. Strawberries are a little short, blackberries and raspberries hurt by drought, no peaches; pears, apples and plums not half crops.

Chicopee (R. W. BEMIS). — The elm tree leaf beetle is doing some damage. Indian corn is not as forward this year as usual; acreage fully up to the average. Haying has commenced, with grass thin and tall, owing to the drought. The acreage of early potatoes is not as large as usual. Market-garden crops planted early are looking well; prices higher than last year. Price and quantity of dairy products fully up to last year. Pasturage is suffering from dry weather. Berries have suffered from the drought.

Hampden (J. N. ISHAM). — Corn is looking well, with a good average acreage planted. Haying is just beginning, with the prospect of little more than half a crop. There is a full acreage of early potatoes, with the promise of only a light crop. Early market-garden crops made a small yield, with usual prices but quick sale; later ones slow in growth. Quantity of dairy products a little less than usual, prices same; dairy cows a shade easier in price. Pasturage is scant, with very slow growth. Strawberries are an extremely small crop, with other berries looking well; cherries only fair.

Monson (A. H. WHITE). — Potato bugs are not as plenty as usual. Indian corn is looking very well, with about the usual acreage. Haying is just beginning, with a light crop. Early potatoes show about the usual acreage, and the showers are helping them along. Quantity of dairy products less than usual, price less; call for dairy cows good, at an increased price. Strawberries are doing fairly well, but dry weather has shortened the crop.

Brimfield (G. M. HITCHCOCK). — Potato bugs are doing some damage. Corn did not come well, but what did come is looking well; acreage about the same as usual. Not much hay has been cut, and the prospect is for a very light crop. Acreage of early potatoes about as usual, with a fair crop promised. Dairy products are low in price, as usual at this season of the year. Pasturage was in very poor condition until the recent showers. Apples will be a small crop.

WORCESTER COUNTY.

Dudley (J. J. GILLES). — Thus far insects are not very numerous, and damage is slight. Indian corn is quite backward, planting still progressing; think the acreage is about average. Haying has not been generally begun, and the crop will not be over 50 per cent of the normal. The acreage of early potatoes is average, and the promise for the crop is fair. Asparagus is a short crop, peas an average crop; prices 15 per cent above the average. The quantity and price of dairy products and the supply and price of dairy cows are about as usual. Pasturage is in poor condition. Strawberries are half a crop, and raspberries are a failure.

Brookfield (F. E. PROUTY). — The corn crop is below the usual average, but the acreage is as large, or larger. Haying has just begun, with the prospect of from half to two-thirds of a crop. The acreage of early potatoes is about as usual, but the dry weather has kept them back. The drought has hurt early market-garden crops, but prices are high. The quantity and price of

dairy products are about the same as usual, but dairy cows sell a little below the last two years. Dry weather has hurt pasturage badly. The drought has hurt strawberries so there will be but a small crop.

Spencer (H. H. KINGSBURY). — Currant worms and potato bugs are doing some damage. The acreage of Indian corn is about as usual, and it has done very well, considering the dry weather. Haying has begun in a small way, with perhaps a two-thirds crop. The usual acreage of early potatoes has been planted; the crop started slowly, and did not get far enough along to be injured by drought. There is no marked variation in the yield and price of early market-garden crops, and the prospect for late ones is very favorable now. Dairy products are in liberal supply, prices weak; dairy stock abundant and prices low. Pasturage is in very satisfactory condition, having improved greatly within the week. There will be a scant crop of apples and pears, no peaches, an average crop of currants and grapes, and a fair one of blueberries, blackberries and raspberries.

Barre (J. L. SMITH). — Tent caterpillars, black and striped squash bugs are doing some damage. Indian corn is small and uneven, with about the usual acreage. Haying has not yet begun, but there is rather more than half a crop. The acreage of early potatoes is about the same as usual, and they are all right so far. The price for milk is the same as last year, but there is more surplus; cows were high in the spring but are lower now. Pastures are in poor condition. Strawberries will be light, on account of dry weather.

Westminster (I. DICKINSON). — Potato bugs are doing some damage. Indian corn is looking very well, with about the usual acreage. Haying has not yet begun, but the prospect is that the crop will be very light. Potatoes are looking well, and a large acreage was planted. Market-garden crops look well, but none have been harvested as yet. Dairy products are low in price, but cows have been high. Pasturage is in very poor condition, owing to dry weather. There will be but very little fruit of any kind.

Princeton (A. O. TYLER). — Corn is backward, and the acreage is about the same as usual. Hay is just starting, with not over half a crop. Early potatoes are looking poorly at present. The quantity and price of dairy products and the supply and price of dairy cows are about the same as last year. Pasturage is in very poor condition. Blackberries and blueberries are looking well.

Lancaster (S. C. DAMON). — Indian corn is in poor condition; acreage about as usual. Haying has begun, with from 50 to 75 per cent of a full crop. There is about the usual acreage of early

potatoes, and they look the best of any crop. The yield of early market-garden crops is below the average; prices better than last season. Quantity of dairy products below average; cows not plenty, and prices good. Pastures are dry. Strawberries are a short crop; currants look well; small fruits generally poor.

Bolton (H. E. BABCOCK). — Canker worms are doing some damage. What corn has come up looks well, but, owing to the dry weather, not much has germinated; acreage an average. Haying has commenced, but there will not be half a crop. The acreage of early potatoes is fully up to the average, and the promise for the crop is good. Early market-garden crops are an average with other years in yield and price. The quantity and price of dairy products are about average; cows high in price. Pastures are in very poor condition. Small fruits and berries are not much grown.

Millbury (C. H. STOCKWELL). — Potato bugs, cut worms and cabbage maggots are doing some damage. Corn is looking fairly well; acreage about the same as in previous years. Some grass is being cut, with the prospect of a very light crop. There is an average acreage of early potatoes, and the promise of a good crop. Early market-garden crops are light, and good prices are realized. Milk will be scarce and dairy cows high. Pastures are all dried up, but will start anew. Strawberries will be a short crop, but later fruits and berries promise better.

Sutton (O. P. JOHNSON). — No insects are proving injurious. Indian corn looks well, with about the usual acreage. Haying has begun, with a poor crop on old ground and the promise of a good one on new ground since the rains. The acreage of early potatoes is increased. Early market-garden crops are about average in yield and price. The quantity and price of dairy products are about the same as usual, with prices for dairy cows higher. Pasturage has been very dry until recently. Fruit is below the average. Strawberries about half a crop.

Hopedale (DELANO PATRICK). — Currant worms and canker worms are doing some damage. Indian corn looks fairly well where it came up well; acreage about as usual. Haying has begun, with not much more than half an average crop. The acreage of early potatoes is about as usual, but the crop is not very promising. Early market-garden crops were below the average in yield, and the prospect is unfavorable for later ones. Cows are shrinking in milk. Pasturage is in poor condition. The outlook for fruit and berries is not encouraging.

MIDDLESEX COUNTY.

Hopkinton (W. V. THOMPSON). — Potato bugs are doing some damage. Indian corn is looking well, with the acreage about the same as usual. Haying has not yet begun, and the prospect is very poor, as our mowing fields are all burned up. The acreage of early potatoes is about the same as usual; condition very fair, but they need rain. Market-garden crops are not much raised. The quantity and price of dairy products are about the same as usual. Pasturage is dry in this vicinity. It has been too dry for fruit and berries; strawberries very light.

Sudbury (E. W. GOODNOW). — Canker worms are doing some damage. Indian corn is very backward, and but little is planted in this section. Haying has begun on old fields, with about 90 per cent of a normal crop. Potatoes are looking fairly well at this time, but the yield is impossible to predict. Early market-garden crops are about normal in yield and price, with the prospect of better prices for those not harvested. The quantity and price of dairy products are about normal. Pasturage is in very poor condition. Strawberries are doing well on low land, but there will be a small crop of fruit and berries in this locality.

Boxborough (J. F. HAYWARD). — Canker worms are doing some damage. Some fields of corn are looking well, others did not come up well on account of dry weather; acreage larger than usual. Haying has begun, with a small crop when compared with the last two years. Rather more early potatoes have been put in than usual, but some have not come up well. Early market-garden crops are smaller than usual, with prices somewhat higher; with rain the prospect is good for later ones. Dairy products are about as usual in quantity and price. Pasturage is in poor condition on account of drought. There will be a light crop of all kinds of fruits and berries if there is not considerable wet weather soon. The season has been the driest known for years.

Ashby (ANSON WETHERBEE). — Potato bugs and rose bugs are doing some damage. Indian corn is a little backward, otherwise quite good; acreage about the same as usual. Haying has begun on early fields with from one-half to two-thirds of a full crop. Early potatoes are looking quite well, but need more rain. Milk is scarce, price same as last year, butter is low; cows are a little higher than usual. Pastures are in very poor condition, owing to dry weather. Strawberries, blueberries and blackberries are looking well; other berries and fruits will be a short crop. Yield of early market-garden crops below average, price above, prospect is that late crops will be rather light.

Pepperell (P. J. KEMP). — Potato bugs and striped squash bugs are doing some damage. Corn did not come up well, what is up looks well, but is late; acreage about 90 per cent of previous years. Haying is beginning, with the crop not half that of last year. There is about the usual acreage of early potatoes, but they were a long time coming up, and are very uneven; it looks like a light crop. The prices for early market-garden crops are about as usual, with the yield light and prospects poor. Dairy products are the same as usual in price and supply, but cows are higher than for years. Pastures are as dry as they usually are in August. There will be no apples, pears, plums, nor peaches.

Dunstable (A. J. GILSON). — Potato beetles and rose bugs are plenty and are doing considerable damage. Indian corn is looking well and the acreage is about the same as in previous years. Haying has not fairly commenced, but the prospect is that the crop will be very light. Very few early potatoes are planted in this locality, but the late varieties are looking well. The quantity of dairy products is about as in former years, and the milk that goes to Boston is taken at starvation prices; good dairy cows command high prices. Pastures are in poor condition. Strawberries have done very well; blackberries and raspberries promise light crops; blueberries set well.

Carlisle (E. J. CARR). — Canker worms and cut worms are doing a great deal of damage. Corn is looking fairly well, with a small acreage. Haying has commenced on high land; crop of English hay, about one-half. The acreage of early potatoes is less than usual, and they are not looking very well. Early market-garden crops are small and prices good. Plenty of milk, and price too low; a good supply of cows, with prices good. Pasturage is the poorest in condition that I ever saw it. Very few apples; very few pears; black cherries not looking well; strawberries hurt by dry weather.

Bedford (HENRY WOOD). — There are a few potato bugs and a few canker worms. Not as much corn as usual was planted, but it is looking fairly well, and if we get rain soon a good crop may be expected. Haying has begun, with not half a crop on the whole and not one-fourth of a crop on some fields. The acreage of early potatoes is less than usual, and they did not come up well. Prices are higher than usual for early market-garden crops, with yields light. The price of dairy products is higher than usual; cows high and milk scarce. Pastures are very dry. Strawberries are suffering from dry weather, and the crop will be light.

Winchester (MARSHALL SYMMES). — Potato bugs and cut worms are doing some damage. Very little Indian corn is raised here.

Haying has begun, and the crop is not over 50 per cent of an average. The acreage of early potatoes is about the same as in previous years; those earliest planted are all right, but the later ones did not come up well. Prices are better for most market-garden crops than for several years. The price of milk is the same as for years, and that of cows is about the same. Pasturage is in very poor condition, there being no feed at all in most pastures. Strawberries are nearly gone; currants will be small, and ripen early. Unless heavy rains come soon, most crops will be very much below the average.

Stoneham (J. E. WILEY). — The brown-tail moth is doing some damage. Corn is not doing well, and the acreage is less than usual. Haying has begun, with the prospect for the crop poor. The acreage of early potatoes is about the same as usual, with the promise for the crop fair. Yield of early market-garden crops poor, prices high; prospect for later ones poor, if we do not have rain soon. The quantity and price of dairy products are both less than usual. Pasturage is in poor condition. Strawberries are the principal berry crop, and if they are not watered they are drying up.

ESSEX COUNTY.

West Newbury (J. C. TARLETON). — Canker worms and potato bugs are doing some damage. Indian corn is not very promising. Haying has begun, as hay ripened before it was half grown. The acreage of early potatoes is about the same as last year, but they do not promise over half a crop. Early market-garden crops are not quite up to last year, but the prospect for later ones is fair. Dairy products and prices for the same are about as last year; dairy cows are plenty. Pastures are very dry, and there is a stoppage in growth. Strawberries made no crop whatever, and there are few currants.

Groveland (ABEL STICKNEY). — Potato bugs and canker worms are doing some damage. Corn is looking fairly well, with an increased acreage. Very little haying has been done, and the prospect for the crop is better than before the rains. The acreage of early potatoes is about as usual, and the crop is looking finely. Early market-garden crops have suffered on account of drought, but the prospect is good for crops now growing. Cows have been in good demand, but the quantity and price of dairy products is not improved. Pasturage is short on account of dry weather. Apples are a small crop; pears fair; plums fair; peaches few; currants good; cherries fair and strawberries good.

Hamilton (ALVIN SMITH). — Potato bugs are doing some damage.

Indian corn is looking finely, and the acreage is about the same as usual. Haying has begun, and the crop will be very poor. The acreage of early potatoes is about as usual, and if we have rain the crop will be very good. The yield and price of early market-garden crops is about the same as usual. Pasturage is in very poor condition. There are no small fruits or berries, on account of the drought.

Wenham (N. P. PERKINS). — Squash bugs, cut worms and canker worms are doing some damage. Corn is looking well; acreage hardly up to the average of some previous years. Haying has commenced to some extent; on high lands the crop is light, on low, well-manured lands fairly good. The acreage of early potatoes is about the same as usual, but many fields have come up poorly, and the crop is likely to be light. The yield of peas and strawberries was larger than was expected, and prices are moderate. Pastures are looking badly, and rain is very much needed. The price of milk remains unchanged; good cows bring high prices and are in demand. Most berries are small in size, having been pinched by the drought.

Danvers (C. H. PRESTON). — Canker worms have done considerable damage. Indian corn is looking well, and some extra is being planted for forage. Haying has begun, with half a crop on some fields and two-thirds of a crop on others. The acreage of early potatoes is about an average one, and the crop promises well. The yield of early market-garden crops has been fair. The supply of milk is short, with prices average; dairy cows are high. Pastures are in very poor condition. Strawberries are doing better than was expected; blackberries look well; currants will be less than an average crop.

Manchester (JOHN BAKER). — Currant worms and striped squash bugs are doing some damage. Corn is looking fairly well, and the acreage is about as in previous years. Haying has begun, and the prospect for the crop is very poor. The acreage of early potatoes is about as usual, and a good crop is promised. The dry weather has kept early market-garden crops back, but the prospect for later ones is good. Dry weather has shortened the quantity of dairy products; price the same as last year. Pastures are in poor condition. Strawberries are poor, not over a quarter of a crop; if there is rain, currants, raspberries and blackberries will do well.

NORFOLK COUNTY.

Franklin (C. M. ALLEN). — Potato bugs are doing some damage. Indian corn is looking discouraged; acreage about the same as

usual. Some hay has been secured, and the crop is very light. The acreage of early potatoes is about as usual, and they are looking well, though rain must come soon. There is the usual quantity of dairy products, and prices are higher than usual. Pasturage is dried up. We have had very little rain for ten weeks, and the outlook is poor.

Norwood (F. A. FALES). — Potato bugs are doing some damage. Indian corn is backward, with the acreage about half that of last year. Haying has begun, but the crop is not over 25 per cent of that of last year. The acreage of early potatoes is about the same as usual, but the crop will be small. Peas are generally yielding well, prices lower than last year. Quantity and price of dairy products about the same as usual. Pastures are drying up. There is a very small crop of strawberries, currants and raspberries.

Canton (E. V. KINSLEY). — Potato bugs are doing some damage. Corn is looking well, but is somewhat backward; acreage about as usual. Haying has begun, with generally about one-third of a crop. The acreage of potatoes is about one-fourth more than usual, and the prospect for the crop is excellent. Yield and quality of early market-garden crops poor, prices very high; prospect poor for later ones. Price of dairy products a little below average; dairy cows in full supply, and price average. All upland pastures are burned up. Strawberries very poor; raspberries, blackberries, and currants good with rain.

Sharon (E. E. NARAMORE). — Insects are doing little damage. There is very little Indian corn planted, and it is on the decrease every year. Haying has begun, and there will be about one-third the usual crop. More early potatoes were planted than usual, but unless rain comes soon the crop will be very light. Yield of early market-garden crops not up to the average, prices about as usual; plenty of rain will insure good late crops. The supply, demand and price of dairy products are about normal. Pasturage has suffered severely from drought. All berries are a short crop, strawberries a total failure.

Stoughton (C. F. CURTIS). — Rose bugs and potato bugs are doing some damage. Early planted corn is doing finely, but late planted did not come well; acreage larger than usual. Haying has begun two weeks earlier than usual; crop only one-half to two-thirds of last year's. Acreage of early potatoes about as usual; crop backward, but holding its own remarkably. Only milk for local market produced, and prices as usual. Pastures are all burned up, and many feed at the barn. Where strawberries were irrigated there was a full crop, elsewhere a failure, and many lost their young beds.

BRISTOL COUNTY.

Easton (H. M. THOMPSON). — Potato bugs and grasshoppers are doing some damage. Acreage of Indian corn same as usual, but crop backward, on account of drought. Haying has begun, with a very poor crop. The acreage of early potatoes is the same as usual, but they are suffering from drought. The yield of early market-garden crops is not as heavy as usual, and the prospect for late ones is not very flattering. Quantity and price of dairy products about the same as usual; good dairy cows bring good prices. Pastures are in very poor condition. The outlook for fruits and berries is fair.

Mansfield (WM. C. WINTER). — Curculios, thrips and rose bugs are doing some damage. Not much corn is planted, and what is looks fairly well. Haying has begun in a small way, with probably two-thirds of an average crop. The acreage of early potatoes is about the same as usual, and they are looking well thus far. Yield of early market-garden crops under the average, prices about as usual. Prices rule about as usual for both dairy products and dairy cows. Pastures are dried up in many places. Apples and pears appear to be fair crops; peaches poor; plums full; raspberries bloomed well; strawberries full.

Attleborough (ISAAC ALGER). — Potato bugs are doing some damage. There is about the usual acreage of Indian corn, and it is looking well. Haying has begun, with the crop about 30 per cent of those of the last two years. The acreage of early potatoes is about as usual. The prices of dairy cows and products and the supply of dairy products are about the same as usual. Pasturage is in poor condition. Apples will again be a small crop. The season is the driest I have ever seen.

Raynham (N. W. SHAW). — Rose bugs and potato bugs are doing some damage. Indian corn is looking well, with about the usual acreage. A few have commenced haying, and there is about half a crop. There is about an average acreage of early potatoes, and they look well. The yield of early market-garden crops is about the same as usual, and prices are a trifle better. There is about the usual quantity of dairy products, with prices about as usual. Pasturage is in very good condition, except for drought. Strawberries are not over half a crop; other berries and fruit have suffered from drought.

Dighton (J. N. PAUL). — Potato bugs and canker worms are doing some damage. Corn is looking poorly, as it did not come up well and needs rain; acreage about average. Haying has begun, with not over half a crop. The acreage of early potatoes is larger

than usual, but they are in need of rain. Early market-garden crops made a good yield, with good prices; prospect poor for later ones. Quantity and price of dairy products about as usual. Pastures are in poor condition. Apples and peaches good; strawberries almost ruined by drought; raspberries badly winter-killed.

Dartmouth (L. T. DAVIS). — Potato bugs are doing some damage. Indian corn is looking well, but is quite small; acreage about as usual. Haying has begun, with about half a crop. The acreage of early potatoes is about as usual, but the promise for the crop is poor. Early market-garden crops did not approach the average in yield, and late ones do not promise well. Quantity of dairy products much below average, prices same as usual; dairy cows about as usual. Pasturage is in very poor condition. Strawberries very short; apples not set very well; plums fair; grapes promise well; currants fair.

PLYMOUTH COUNTY.

Hingham (AARON LOW). — Potato bugs and cut worms are doing some damage. Corn is small and backward, owing to the severe drought. The hay crop will be very short. There is about the usual acreage of early potatoes, and the vines are looking very well. All garden crops are suffering badly from the extreme drought. Quantity and price of dairy products about as usual. Pastures are in very poor condition. Strawberries are badly injured by dry weather; other berries small supply; apples have dropped badly.

Marshfield (J. H. BOURNE). — Potato bugs, rose bugs and a few canker worms are doing some damage. The acreage of Indian corn is a little less than usual, and the crop is not looking well. Haying has begun, with not half of last year's crop. There is the usual acreage of early potatoes; crop later than last year, and prospect not encouraging. Milk is fully up in quantity; cows plenty, prices ruling high. Pastures are drying up. Apples about as last year; peaches few; strawberries 10 per cent of a crop.

Hanson (F. S. THOMAS). — Cut worms and squash bugs are doing some damage. Corn looks fairly well, with about the usual acreage. Haying has nearly finished, and the crop is not over one-fourth of a normal one. Drought has ruined many market-garden crops, prices about as usual. The acreage of early potatoes is about as usual, and the prospect fairly good. Upland pastures are all dried up, lowland fairly good. Trees did not blossom much, and drought spoiled much of the small fruit.

Duxbury (A. M. GOULDING). — Potato bugs are doing some damage. Corn is looking well, but there is a decreased acreage.

Haying is under way, with not over half a crop. Potatoes are looking fairly well, but rain must come immediately to save them. Early market-garden crops made poor yields, prices average; prospect for later ones poor. Quantity and price of dairy products about as usual; supply of cows fair, and prices falling. Pastures are very short and dry. The outlook for fruits and berries is poor.

Halifax (G. W. HAYWARD). — Potato bugs are doing some damage. Indian corn is backward, acreage fully up to the average. Haying has begun, with the prospect of not more than half a crop. The acreage of early potatoes is fully up to the average, with the prospect dubious. Yield of early market-garden crops very light, prices much as common; prospect for later ones poor. Quantity of dairy products diminished, prices full average; price of cows fully as high as common. Pasturage is very poor. Strawberries are nearly a failure.

Lakeville (ELBRIDGE CUSHMAN). — Rose bugs and tent caterpillars are doing some damage. Indian corn is looking well, and the usual acreage is somewhat increased. Haying is well under way, with about half a crop. There is a large increase in the acreage of early potatoes, and they are looking quite well. At this writing there has been hardly any garden truck marketed, and, unless there is rain soon, there will not be. Milk is getting scarce, and cows maintain their former prices. Pasturage is nearly a total failure, and most farmers are feeding in the barn. Unless abundant rain comes soon, all fruits and berries will be nearly a failure.

BARNSTABLE COUNTY.

Bourne (D. D. NRE). — Potato bugs are doing some damage. Scarcely any Indian corn was planted this year. Haying has commenced, with the crop very light. With rain early potatoes promise to be a fair crop. Early market-garden crops made fair yields, and the prospect is good for later ones. The price of dairy cows is up to the top notch. Pasturage looks well, but rain is needed. Strawberries are plenty and selling well, but there would have been many more bushels of berries but for dry weather.

Falmouth (D. R. WICKS). — Potato bugs are doing some damage. Corn is looking fairly, considering the drought. Very little hay has been cut; on good, strong, fertilized land there is a two-thirds crop, but old meadows are hardly worth cutting. There is about the usual acreage of early potatoes, but the vines do not look well, and the drought has probably cut the crop short. Prices for early market-garden crops are higher than usual. Pastures are

all burned up. Strawberries are about a failure, currants good, blackberries and raspberries blossomed well, peaches never looked more promising.

Barnstable (JOHN BURSLEY). — Fire worms and cut worms are doing some damage. Indian corn shows a poor stand, much seed failing to germinate; acreage average. Haying is half done, and the crop is not over one-fourth that of last year. There is the usual acreage of early potatoes, but the crop will be light because of lack of moisture. Only those who are able to irrigate can secure any market-garden crops. Dairy products are about 75 per cent in quantity, price as usual; full supply of dairy cows, without any demand. Pasturage is all dried up. Strawberries are half a crop; cranberries are looking very well. The showers of June 15th and 20th did not reach this locality.

Harwich (A. N. DOANE). — Potato bugs and cranberry worms are doing some damage. Indian corn is looking fairly well, with no increase in acreage. Haying has not yet begun, but the crop will be short. The acreage of early potatoes is about the same as usual, and they are looking well. Early market-garden crops are very light. Pasturage is used up by the drought. Strawberries are a failure. Too early to estimate as to cranberries. The dry weather has used Cape Cod hard.

Orleans (F. E. SNOW). — Plant lice are proving quite troublesome. Indian corn has but just germinated in many cases on account of the dry weather; acreage very slight at any time. Haying has begun, with a very light crop. There is about the usual acreage of early potatoes and they have suffered much from drought. The quantity and price of dairy products and the supply and price of dairy cows is about the same as usual. Pasturage is rather short on the uplands.

DUKES COUNTY.

West Tisbury (GEO. HUNT LUCE). — Potato bugs are doing some damage. Indian corn is backward, on account of dry weather; acreage average. Haying has begun, with the prospect of the lightest crop for years. The acreage of early potatoes is average and the promise for the crop poor. The early market-garden crops are a failure, but the prospect for later ones is fair. Cows are high and not very plenty; dairy products higher than for some years. Strawberries are badly damaged by drought, and in some cases ruined.

BULLETIN OF
MASSACHUSETTS BOARD OF AGRICULTURE.

SUGGESTIONS FOR THE USE OF BARNYARD MANURE.

By CHAS. WELLINGTON, Ph.D., *Professor of Chemistry, Massachusetts Agricultural College.*

In these latter days of human progress every department of activity has become complex, and is with every day becoming more so. That most important and fundamental of all callings, *farming*, offers no exception here. Of all the factors that enter into his business, *over which he has control*, barnyard manure is at once the most valuable and the most abused by the farmer. It is the most valuable, because, although a waste product of all general and stock farming, it nevertheless contains the three most costly elements of plant food (nitrogen, potash and phosphoric acid), and, what is more important, it is the only *entire* all-round fertilizer known. It is the most abused, because the farmer either knowingly or unknowingly handles it wastefully, and largely allows it to become valueless before reaching the growing crop.

Professor Roberts allows \$250, at least, as the value of the manure for seven months on a small farm with four horses, twenty cows, fifty sheep and ten pigs. By the present wasteful management, one-third of this, \$83.33, is on the average lost to the farmer. The annual value of this material for the United States is placed at \$2,071,400,000. One-third, or \$690,466,666 is *lost annually to the farmers of this country*. Could any other national business be carried on with such a loss, and be made to pay? This is *only one* of the much-talked-of "*wastes of the farm*," and yet this alone furnishes abundant proof that *farming does pay*. For that large number of so-called "*farmers*" *who knowingly waste their barnyard manure* there is *positively* no help. They also waste at every point; they are not *business men*, and therefore they are not *farmers*. For *true farmers* who are at their business for what there is in it, and for all that hard, persistent thinking and careful practice can make it, who *unknowingly waste barnyard manure*, here is an

opportunity to make a saving equal to the difference between success and failure. For that, frequently, equals the value of the manure wasted. This is to be secured by following the practice approved by the results of hundreds of experiments made by careful workers. In the succeeding pages these results are summarized. We will consider briefly:—

- I. What barnyard manure is made of.
- II. How it compares with *other* manures.
- III. How to make it.
- IV. How to use it.

I. — WHAT BARNYARD MANURE IS MADE OF.

Barnyard manure consists of the dung and urine of horses, cows, pigs, sheep and winged animals, sometimes of human beings, and “litter” mixed in all imaginable proportions with more or less of “fixers” and preservatives. The domestic animals feed chiefly on vegetable material. This is taken partly from the field direct, in the form of grain, hay, straw, roots, etc., and partly as by-products from various factories, like bran, gluten meal, oil cakes, brewers’ grains, pomace, etc. When any of this material is fed, about one-half of its organic portion, containing the nitrogen, is digested, and serves as food for the animal. It is eventually either dissipated into the air, through the breath, in the form of carbonic acid gas and water, or is deposited as muscle and fat, hair, wool or milk, or is transformed into work in the case of draught animals. The other half, the undigested portion, goes through the organism, and, while most of it falls as dung, a considerable portion of the *nitrogen* passes through the kidneys *into the urine*. The mineral or ash constituents of the food, including *potash* and *phosphoric acid*, also go partly into the digested portion, partly into the dung and partly into the urine. The dung and urine of work animals contains all of the nitrogen, potash and phosphoric acid taken in the food; while in young, fattening or milk animals, portions of these go into bone, flesh and milk.

This mixture of dung and urine is collected in tanks for several months in some countries, as, for example, in Holland and Switzerland, without further admixture. It is then called *Gulle*. It undergoes a peculiar fermentation, and is spread as a liquid over the fields. In most countries, however, as with us, the better way is followed, of using litter for the double purpose of making confined animals clean and comfortable, and of absorbing the liquid portion. This litter consists of almost any light, dry, waste material, such as straw, leaves, sawdust, land plaster or dry earth.

Dung and Urine. — The value of these depends on the food, age, breed, condition and work of the animal. The richer the food, the richer the excreta; the older the animal, the richer the excreta. A working animal will yield more value in excreta than one which is fattening.

Dung. — This consists of the undigested and undissolved portion of the food. It is much poorer in plant food than the *Urine*, which has more manurial value, and should be most *carefully saved and used*. It consists of substances which have been digested, and which are therefore very quickly assimilated by plants.

The following table (from Wolff) shows the percentages of nitrogen in the original food which go into the dung and urine of the respective animals: —

	Horse.	Sheep.	Ox.	Cow.	Average.
Dung (per cent), . . .	32.4	46.7	33.9	47.5	40.1
Urine (per cent), . . .	60.7	42.3	54.8	31.0	47.2

Phosphoric acid is practically wanting in horse and cow urine; sheep urine has somewhat more. The largest amount is in pig urine, but even there it is present only in traces. Sheep urine is the most valuable; next comes horse urine, then cow urine, and, last of all, pig urine, counting *all the elements* together.

Litter. — The qualities which should be looked for in a good litter are: —

1. A conservative action on the fermenting dung and urine.
2. Rapidity of disintegration.
3. A high water absorbing and retaining power.
4. Cleanliness.
5. Relatively high contents of nitrogen, potash and phosphoric acid.
6. Low market value.

The following list contains most of the materials commonly used, and as to the above qualities 1, 2, 3 and 5, it gives them in the order of their values, beginning with peat moss, the highest in value: —

Peat moss.	Winter rye straw.
Peat.	Barley straw.
Dry loam.	Wheat straw.
Dry muck.	Sawdust.
Summer rye straw.	Dry leaves.
Oat straw.	

The reason for giving preference to peat moss and the three following materials is because they possess the first quality in the highest degree. This will be considered further under the head of "How to make barnyard manure." But when cleanliness is considered the straws rank first, and peat, muck and loam come last. Sawdust and leaves decompose very slowly, and leaves especially have but little nitrogen, potash or phosphoric acid left in them. Unfortunately, all the good qualities are not possessed by any one material. Peat, etc., have the highest conservative power, but they are not cleanly. The clean straws, however, are the poorest in conservative power, because they support the bacteria which do harm. (See "How to make barnyard manure.")

Although high percentages of nitrogen, potash and phosphoric acid are valuable in litter, the best of these materials contain only small amounts, and this quality is outranked by those placed before it in the above list in giving value to barnyard manure.

"*Fixers.*" — When manure is stored at any depth over a few inches, it ferments, and large quantities of the most valuable nitrogen become soluble and volatile in the form of ammonia, which is a gas. This gas is well known as "hartshorn," and is easily recognized by its strong odor. It forms very rapidly in the presence of a limited amount of moisture and a somewhat elevated temperature. Urine is its principal source, and next to that comes horse dung.

It is very important that *all* this gaseous form of nitrogen be saved, and whenever its odor is detected, means should immediately be taken to "fix" or absorb it. No space containing manure should be allowed to smell of ammonia. Substances used for this purpose are: —

Hydrochloric acid, which fumes strongly.

Sulphuric acid, which does not fume, but corrodes everything it touches, *e. g.*, the hoofs of horses and cattle.

Neither of the above should be employed.

Green copperas is good, but it is also slightly corrosive, and often injurious to crops.

Gypsum or land plaster is excellent.

Sulfate of magnesia is the same. It sometimes combines with and holds the soluble phosphoric acid.

These materials are sprinkled daily over the floor and manure.

Preservatives. — While the foregoing substances retain the ammonia, they do not *prevent* fermentation. Sometimes a farmer wishes to accomplish both of these ends. The following substances, when mixed with the manure, act in this *double way*: —

Sulfate of magnesia, or kieserite.

Double sulfate of potash and magnesia.

Carnallite and kainite, containing chloride of potash, salt, sulfate of magnesia and chloride of magnesia.

When these are used, account is taken of the addition of potash to the manure.

Charcoal and peat are also good fixers, and to an extent preservatives.

The finished manure from different animals shows very different qualities : —

Horse manure is the most uniform of all, because the horse's food is the most uniform, and generally of the same kind. It is a rich manure, and ferments quickly, producing much heat. It is known as a *hot* manure. There are 9.9 pounds of dry excrement with .26 pound of nitrogen produced daily by each animal. From 4 to 6 pounds of straw are used daily.

Sheep manure is, weight for weight, the most valuable of all. It contains more nitrogen and phosphoric acid, but less potash, than horse manure. It does not decompose so readily, and is next to horse manure as a heater. There are .97 pound of dry matter, having .04 pound of nitrogen, produced daily per animal. Three-fifths of a pound of litter is used daily.

Pig manure is generally rich, does not develop much heat, and is called *cold*. It should always be mixed with other manure. There are 1.5 pounds of dry matter with .05 pound nitrogen produced daily per animal. From 4 to 8 pounds of straw daily per animal are recommended.

Cow manure is very much less constant in composition than that of the horse. It decomposes slowly, with the evolution of little heat. It is the poorest in plant food of any farm manure. There are 9.92 pounds dry matter, having .26 pound nitrogen, produced daily per animal. From 6 to 10 pounds of straw daily per animal are used.

Poultry manure resembles guano in composition, but is less valuable. Its nitrogen is in a very assimilable form. It ferments rapidly.

Night soil is of high value if *immediately* and regularly composted, otherwise it loses its good qualities.

II. — HOW BARNYARD MANURE COMPARES WITH OTHER MANURES.

In judging the value of any manure or "fertilizer,"* six points must be borne in mind ; namely, the percentages of nitrogen, potash, phosphoric acid and lime ; fifth, the availabilities of each ; and,

* In this paper, "manure" and "fertilizer" mean the same thing.

sixth, the mechanical effect which the manure has on the soil. With reference to these, let us examine the following table, which classifies the principal kinds of manures :—

Manures, .	Entire,	{	Barnyard manure.	{	Oil cake.
			Other wastes, .		Malt germs.
					Wash waters.
	Partial, .	{	Composts, . . .	{	Sewage, etc.
					Various.
			Mixed,		Human excrements.
	Concentrated, .	{		{	Guano.
			Nitrogen, . . .		Various ashes.
					Nitrate of soda.
			Potash,		Sulfate of ammonia.
					Ground meat.
	Lime,	{	Phosphoric acid, .	{	Ground fish, etc,
					Muriate of potash.
					Sulfate of potash, etc.
					Raw phosphates.
					Superphosphates.
					Various lime wastes.

While many valuable manurial substances are mentioned in the column at the right, only the first, barnyard manure, contains all the elements of fertility, and at the same time the power to improve the soil mechanically. This is why it is called *the* “entire” manure.

Barnyard manure deserves such a name more than any other manure, but farmers are often sadly misled by such a designation; for it is supposed that, if this “entire” manure is applied to the fields, *no other* manuring can be necessary. This designation *means simply* that every one of the requirements of a manure is found in barnyard manure, to a *certain degree*. But this degree is unfortunately very small except in one particular. It brings into the soil a large quantity of organic matter, which forms *humus*. This increases the power of the soil to attract and retain moisture, makes it more porous, promoting aeration and fermentation and the bringing of all plant food into forms available for the crops. For clayey or heavy soils it is of greatest value, and of least on light and porous soils. Herein lies the chief value of barnyard manure.

The analysis of a *good* half-rotted barnyard manure gives :—

	Per cent.	Pounds per Ton.
Nitrogen,606	12.12
Potash,672	13.44
Phosphoric acid,315	6.30

That is to say, an application of 2,000 pounds of barnyard manure brings into the soil practically only 12 pounds of nitrogen, 13.40 of potash and 6.3 phosphoric acid, — very small amounts. An average cropping is found to remove from one acre of land, in one year — 50.5 pounds nitrogen; 41.6 pounds potash; 19.1 pounds phosphoric acid.

To return these amounts to the land would require, — 8,333 pounds of barnyard manure for the nitrogen; 6,332 pounds of barnyard manure for the potash; 6,064 pounds of barnyard manure for the phosphoric acid.

These figures show that barnyard manure contains too little nitrogen in proportion to its potash and phosphoric acid, and this has been proven over and over again. Of all plant food, the soil lacks and needs most *nitrogen*.

As to the proportion of potash and phosphoric acid: they are shown by the last two weights given to be replaced in the soil by nearly the same weight of barnyard manure. This might suit in some soils, but in very many it would not. In England they find this proportional amount of phosphoric acid too little, while in Massachusetts the proportion of potash is too little.

Barnyard manure excels, therefore: —

1. Because it brings into the land a large amount of the much-needed humus.

2. Because it contains some of every kind of plant food. Nothing can take the place of barnyard manure.

It is deficient.

1. In all the three costly elements of plant food.

2. Especially in nitrogen.

3. For Massachusetts, in potash.

It must therefore be re-enforced by all three elements, *especially* by nitrogen and potash.

III. — HOW TO MAKE BARNYARD MANURE.

Barnyard manure should be made with reference to the preceding and the following statements. *It should be made under cover*, to prevent the addition of an excess of rain water. It should be made in a room with water-tight floor and sides, in order to prevent drainage, the drainings being the most valuable part. It should not be stored under or over stock, because of its unhealthy gases.

Apparently the most economical arrangement which meets these conditions is a room placed in the rear of a horse or cow stable, running parallel to the latter and separated from it by a tight wall provided with slide windows, through which the manure may be

thrown from the manure trough behind the animals. This room would then probably be long, and just wide enough to hold the accumulations of the season. A better, though more expensive way, is to provide a square or round room, to which the barnyard manure may be carried in a wheel-barrow or cart.

One of the litters before mentioned should be provided daily, the amount to be used being calculated according to the amount of liquid present. With horses, allowing $6\frac{1}{3}$ pounds of dry dung and $22\frac{3}{4}$ pounds (about three gallons) of urine per day and per animal, the proper amount of straw would be from 4 to 6 pounds daily. This would give from $5\frac{1}{4}$ to $5\frac{1}{2}$ tons per horse, annually. With cows, the Germans calculate the dry substance in the food, and take litter equal to one-third of that weight. A somewhat extended practice is to shake out the clean straw from the horse manure in the morning, allow it to dry in the open air and then use it over again. This allows of making a more comfortable bed for the animals without admixing an excess of litter. If properly done the method is not a bad one, but if it increases the evaporation of fermented urine, it should not be followed.

The floor should be sprinkled daily with a very thin coat of one of the fixers, land plaster being one of the best. If it is desired to hinder fermentation, a *preservative* may be sprinkled on the manure pile daily.

As has been seen, the manures from different animals differ considerably in their qualities. For special purposes it is often advisable to keep these apart. If a "hot" manure for forcing is desired, then horse manure should be made alone, or at the most mixed only with sheep manure. Poultry manure acts quickly, its constituents, especially the nitrogen, being in a very assimilable form. Fixers should be spread in the poultry yard and the material mixed with peat or muck. This gives a very valuable product for *truck*. Manure for general purposes is best when made of an intimate mixture of the dung and the urine from all the animals. Careful mixing when the manure is thrown on to the pile is of great importance. It aids in preventing "fire-fang" in the hot horse dung, and promotes fermentation in the *cold* varieties. Leaching should be prevented as much as possible. If it occurs, and it generally does, the leached liquor should be thrown on to the heap as evenly as possible, by means of a scoop or a pump with a long adjustable spout. This precaution is not merely to save the liquor, but also to promote proper fermentation.

In case of a large proportion of hot horse manure, this liquor may not be sufficient to maintain a regular fermentation. The manure may "fire-fang" and smoke. In that case it will be

necessary to sprinkle with water from day to day until such action ceases. This wetting, whether with the leachings or with water, should be done with the most possible regularity. After the manure is placed on the pile, it should not be disturbed, but it should be stamped and packed away from the air. These steps are necessary to prevent the loss of potash and phosphoric acid, and especially of nitrogen, both by the formation and evaporation of ammonia and the separation and escape of nitrogen gas itself.

As the making of barnyard manure is principally a matter of fermentation, special study should be given to this combination of changes. When a pile of manure lies for months without disturbance, it grows smaller and smaller. It is comparatively dry, the straw has disappeared and become "humus." The whole mixture is more uniform in color and character. It is half rotted; then, after a few more months the bulk has grown very much smaller, and a black, moist, slimy homogenous mass results; the manure is well rotted.

Chemists have long known in a general way what changes take place during this process, but not until recently has anything like a satisfactory explanation of them been made. This explanation depends upon the discovery of existence and actions, in the manure, of three classes of very small microscopic organisms called bacteria. They are responsible, not wholly, but chiefly, for the changes mentioned. Let us note here just what chemical materials are in the manure at the beginning, and what they are changed into.

The fresh manure contains mineral substances like potash and phosphates, and also organic material of two kinds, namely: The nitrogenous, found in the liquid manure and to some extent in the solid, and the non-nitrogenous, which largely makes up the straw, leaves, sawdust and solid excrement. It is just these two kinds of organic constituents, and what they become, which concern us now.

In those portions of the manure which are accessible to the air one class of bacteria live and breed in enormous numbers. They feed on the oxygen of the air and the nitrogenous portions of the manure, and, in their excrements, give off large quantities of nitrates, the latter being the direct products of the oxidation of nitrogenous organic matter anywhere, whether in the bodies of these bacteria or not. These nitrates, being very soluble in water, drain down into the interior of the manure heap, just as they drain through the soil. But instead of all going off in the drainage water and becoming lost, as they often do in the soil, they are chiefly lost by an entirely different process.

In the interior of the heap, shut away from the air, these nitrates fall prey to another class of bacteria, known as "nitrate de -

stroyers." They completely undo the work of the other bacteria, or "nitrate formers." The "nitrate destroyers" live on the non-nitrogenous constituents of the straw and leaves and the oxygen of the nitrates. This liberates the nitrogen in the form of gas, which escapes into the air and is lost to the farmer. The process also consumes the non-nitrogenous portion, which is chiefly the remainder of the litter. It is formed into water and carbonic acid gas, which escape into the air and thus diminish the bulk of the pile. While the "nitrate formers" live near the surface of the manure and require air for their work, the "nitrate destroyers" live away from the air and do not need it. They are dependent, however, on food of a certain kind, and must have plenty of it, otherwise they become inactive and can do no damage, though millions of them may exist in the interior of the manure pile. One of their principal foods, the non-nitrogenous material of the litter, they cannot use as food until it has been made soluble by a third class of bacteria, which causes the rotting of the litter. Nitrates are also indispensable for their nourishment. If, therefore, they are deprived of either one of these constituents of their diet they either die or at least become harmless.

The work of the "nitrate formers" is beneficial; it converts organic nitrogen into nitrate, a most available form of plant food. Half-rotted manure contains nitrogen largely in this form. The work of "nitrate destroyers" is destructive. It removes the soluble nitrates from the manure. It converts half-rotted manure into well-rotted manure. In this way the different effects produced by manure in the three different conditions are explained. The nitrogen in fresh manure is largely organic and not immediately available. It, therefore, has a slower and less effect than half-rotted manure. The nitrogen in half-rotted manure is largely in the form of nitrates, and this is available. The nitrogen in well-rotted manure has all been converted into nitrates also, and was once available, but has subsequently been lost in the air. This is why the well-rotted condition is the least valuable of the three.

Of the three common conditions of barnyard manure, half-rotted manure is the most valuable, and well-rotted manure the least, because of their relative amounts of nitrates.

Manure should be kept packed away from the air as tightly as possible, and, if rotted, should be ploughed under just before planting, otherwise, several months before that time.

The more litter used in the manure, the greater liability to loss of nitrogen.

The use of bedding material free from decomposable organic matter is a means of protection against loss of nitrogen.

IV. — HOW TO USE BARNYARD MANURE.

We have now reached the difficult part of the matter. The *most* economical use of barnyard manure is seldom made, largely because of our ignorance of the exact needs of the plant, in the particular soil used. Some general rules, however, may be laid down.

The farmer should strive to place the manure at the disposition of the growing crop just at that moment when the most nitrate has been formed and before any has been destroyed. The most favorable conditions are obtained when fresh manure is packed as tightly as possible, away from the air, and kept in that condition until half-rotted, and then ploughed under just before planting or sowing. Under these circumstances, although the third class of bacteria have in the rotting of the litter made soluble food of one kind for the "nitrate destroyers," the latter have been deprived of their necessary food, the nitrates, for none could be formed in the tightly packed mass, and they have remained harmless. But the heap has become half rotted even without them. After the manure is ploughed in, the "nitrogen formers," now having plenty of air rapidly produce nitrates which are beyond the reach of the destroyers; for by this time all their soluble non-nitrogenous food has been decomposed and has gone into the air, leaving them to die. The growing plants in the mean time absorb the nitrates.

If fresh manure is ploughed in directly before seeding, a poor result is obtained, for the nitrates are not formed until after the plants have passed their growing period, and they consequently starve. As might be supposed, winter crops fare better with this procedure than spring crops. By ploughing in fresh manure several months before seeding, a much better result is obtained because the nitrates are on hand and are being formed at the growing period of the crops. Experience has abundantly proven that it is better to plough manure into the soil and allow it to lie there rather than in the pile. Whether it is better to leave manure spread on the surface of the land rather than to plough it in or leave in pile, depends chiefly on the amount of loss caused by surface drainage. This may be small, but, if the ground is frozen, the surface inclined and the manure half rotted or more, the loss will be considerable. The nitrate-destroying bacteria are of several species, and have thus far been found in straw and various other litter, in soils and in the dung of herbivorous animals. They have not been found in human excrement, or that of the carnivora or birds.

When barnyard manures are made with bedding devoid of much decomposable organic matter, the nitrate destroying bacteria can-

not work in them, for they cannot obtain the soluble organic food necessary for their sustenance. Anything like sand, loam or turf, therefore, may be used for bedding without incurring the disadvantage due to straw litters.

Wherever much nitrate of soda is applied to crops, there is produced a relatively large yield of straw, which, in turn, leads to a large use of this material as litter. This excessive quantity of straw in the manure materially lessens its value in the manner described.

Manure is brought from the storage to its place in the field by four different methods:—

1. It is unloaded in the field into large heaps, and, after remaining there a convenient time, is spread over the land and ploughed in.

2. It is distributed in small heaps, and then treated as before.

3. It is spread evenly over the land, and allowed to lie a long time.

4. It is evenly spread and immediately ploughed under.

Unquestionably the last method is the best of all, the first is the second best and the third is the poorest way of all. The reasons for this are very apparent, when it is remembered that the half-rotted manure should be placed at the disposition of the growing plant at the earliest moment, with the least possible opportunity of loss by evaporation or drainage. It should be evenly distributed over the land. This is impossible to attain, when it is first deposited in heaps and allowed to drain into the patches of soil under the heaps, before being spread.

As to the amount of barnyard manure to be applied to the land for various purposes, a general rule may be mentioned here, which should apply in all manuring. Only apply as much as seems to be necessary for present purposes. The old method of stocking land with barnyard manure for future use is a waste.

Special formulas for various crops, either alone, or with other manures, may be found in the bulletins of the Hatch Experiment Station of the Massachusetts Agricultural College. These can be easily obtained by application to the director at Amherst.

MASSACHUSETTS
CROP REPORT

FOR THE

MONTH OF JULY, 1899.

ISSUED BY

J. W. STOCKWELL,
SECRETARY STATE BOARD OF AGRICULTURE.

BOSTON :
WRIGHT & POTTER PRINTING CO., STATE PRINTERS,
18 POST OFFICE SQUARE.
1899.

CROP REPORT FOR THE MONTH OF JULY, 1899.

OFFICE OF STATE BOARD OF AGRICULTURE,
BOSTON, MASS., Aug. 1, 1899.

Bulletin No. 3, Crop Report for the month of July, is herewith presented. Particular attention is called to the article on "The elm-leaf beetle in Massachusetts," by A. H. Kirkland, M.S., assistant entomologist to the committee on gypsy moth, insects and birds. Those whose elms have been attacked by this new pest will find this article very instructive and helpful, and those having elms on their premises should give it careful attention, as this insect seems likely soon to be prevalent in all parts of the State.

PROGRESS OF THE SEASON.

The July returns of the United States Department of Agriculture (Crop Circular for July, 1898) state that the preliminary returns of the acreage of corn indicate an increase of about 3,835,000 acres, or about 4.9 per cent on the acreage harvested in 1898. The average condition, 86.5, is 4 points below the condition of July 1 of last year, and 4.6 points below the mean of the July averages of the last ten years.

The condition of winter wheat, 65.6, is 1.7 points lower than on June 1, 20.1 points below the average on July 1 of last year, and 16.8 points below the mean of the July average of the last ten years. The average condition of spring wheat is 91.7, which is 0.3 point higher than last month, 3.3 points lower than on July 1, 1898, and 3 points higher than the mean of the July averages of the last ten years. The average condition of spring and winter wheat combined is 76.2, or 13.2 points below the condition on July 1, 1898; 8.7 below that on the corresponding date in 1897, and 7.2 below the mean of the July averages for the last ten years. The proportion of the wheat crop of 1898

reported as still in the hands of the farmers is 9.49 per cent, or a little over 64,000,000 bushels.

The average condition of the oat crop is 90, which is 1.3 points higher than last month, 2.8 points lower than on July 1, 1898, 2.5 points higher than on July 1, 1897, and 2.3 points above the mean of the July averages for the last ten years.

The average condition of barley is 92, which is 0.6 point higher than last month, 6.3 points above the average on July 1, 1898, and 3.7 points above the July averages of the last ten years.

The average condition of winter rye is 83.3, which is 10.05 points below the condition on July 1, 1898, and 7.2 points below the mean of the July averages for the last ten years. The average condition of spring rye is 89.7, which is 7.2 points below the condition of July 1, 1898, and 0.9 point below the mean of the July averages for the last ten years.

The average condition of cotton is 87.8, which is 2.1 points higher than last month, 3.4 points lower than on July 1, 1898, 1.8 points higher than at the corresponding date in 1897, and 0.2 point below the mean of the July averages for the last ten years.

There is an increase of 1 per cent in the acreage of potatoes. The average condition is 93.8, which is 1.7 points below the condition on July 1, 1898, and 0.5 point above the mean of the July averages for the last ten years.

Most of the States of principal production show a decreased acreage of sweet potatoes, and the condition is generally below the fifteen-year average.

There is unquestionably a somewhat smaller acreage in tobacco than there was last year, and in nearly all the principal States the condition is below the July average of the last ten years.

There are few States in which the condition of clover has not declined during the month of June.

Except in the north central States, the condition of timothy is below the ten-year average.

There was a general decline in the condition of apples during the month, and there are few important apple States

in which the condition is not considerably below the average of the last fifteen years. The peach crop will be a general failure, but the outlook for grapes is promising.

In Massachusetts the acreage of corn as compared with last year is 103, and the average condition July 1 is 89; the average condition of oats, 86; the average condition of barley, 84; the average condition of spring rye, 77; the acreage of potatoes, 102, and the average condition, 89; the average condition of tobacco, 90; the average condition of clover, 68; the average condition of timothy, 66; the average condition of pasture, 68; the average condition of apples, 48; the average condition of peaches, 26; and the average condition of grapes, 88.

TEMPERATURE AND RAINFALL FOR THE WHOLE COUNTRY.

(FROM THE UNITED STATES CLIMATE AND CROP BULLETINS.)

Week ending June 26. — The week averaged warmer than usual in the Ohio, central Mississippi, and lower Missouri valleys, over the interior portions of the east Gulf and middle Atlantic States, and on the northern New England coast. Generally throughout the Rocky Mountain and Pacific coast districts, and elsewhere in local areas, the week averaged cooler than usual. The precipitation in the districts east of the Rocky Mountains was upon the whole below the average. Very heavy local rains occurred in Nebraska, central Iowa, northern Kansas, central and southern Ohio and southern New England. Over the greater part of the country the weather conditions were highly favorable for the growth of crops. Winter wheat harvest was in progress in the more northerly regions, and the prospect for spring wheat continued good. Haying continued under generally favorable conditions.

Week ending July 3. — The week was generally slightly cooler than usual over the greater part of the country east of the Rocky Mountains, as well as in the northern Rocky Mountain region and on the Pacific coast. The week showed phenomenally heavy precipitation in central and eastern Texas, and more than the usual amount fell over

limited areas elsewhere, including southern New England. The lower Missouri, central and lower Mississippi and Ohio valleys, the middle Atlantic States, and northern New England received much less than the usual amount of rain. Corn made very favorable progress in the principal corn States. Harvesting of late winter wheat continued under favorable conditions, and the outlook for spring wheat was promising.

Week ending July 10. — Nearly normal temperature conditions prevailed in the southern States. On the central Rocky Mountain slope, over portions of the central valleys, Lake region, middle and south Atlantic States the week averaged slightly cooler than usual. Over the plateau regions, New England and the northern portion of the middle Atlantic States the week averaged warmer than usual. Very heavy rains fell in the lower Missouri and central Mississippi valleys, and over portions of the upper Lake region and Atlantic coast States. From Michigan southward over the central Ohio valley and Tennessee, and over the greater part of the Gulf States the rainfall was less than average. The weather conditions were for the most part favorable for farming operations and crop growth in districts east of the Rocky Mountains. The week was favorable for corn, and winter wheat harvest was generally finished. Cotton generally made good progress, as did tobacco in the middle Atlantic States, and New England.

Week ending July 17. — The week averaged slightly warmer than usual in southern New England, over the interior portions of the south Atlantic and east Gulf States, and in the lower Ohio and central Mississippi valleys. The week was decidedly warmer than usual over the northern plateau region and on the north Pacific coast. The week averaged cooler than usual in the Lake region and over portions of the upper Mississippi and lower Missouri valleys, in the west Gulf States, and over the middle and southern Rocky Mountain slope. There was more than the average amount of precipitation over the middle Rocky Mountain slope and over portions of the lower Missouri and upper Mississippi valleys. Much the greater part of the country

received less than the usual amount, there being a total absence over an extensive area in the Gulf States. Drought prevailed over a large part of the Gulf and south Atlantic States. Corn made excellent growth in all northern districts. Oat harvest was well advanced in the central valleys and middle Atlantic States.

Week ending July 24. — The week was warmer than usual in the Atlantic coast and Gulf districts, with the exception of Florida Peninsula and New England, where it was cooler than usual. It was also warmer than usual in the Ohio valley, over the southern half of the Lake region, from the upper Mississippi valley westward to the Rocky Mountains, and over the greater part of California. Over the northern half of the Lake region, lower Missouri and central Mississippi valleys, plateau regions, and north Pacific coast the week averaged cooler than usual. Very heavy rains fell in the east Gulf states, Tennessee, Arkansas, Oklahoma, southern Kansas and northwestern Texas. From the central Rocky Mountain region eastward over the Missouri, upper Mississippi, and upper Ohio valleys, middle Atlantic States and the greater part of the Lake region the rainfall was less than usual. Corn made favorable growth in the corn States. Winter wheat harvest and oat harvest were nearly completed.

SPECIAL TELEGRAPHIC REPORTS.

(WEATHER BUREAU, BOSTON.)

Week ending June 26. — New England. Boston : Drought unbroken in western Connecticut, central and northern New Hampshire and Vermont ; copious showers elsewhere, considerable damage by hail ; general situation slightly improved ; hoed crops growing rapidly ; haying well under way in south, fourth to half usual crop indicated.

Week ending July 3. — New England. Boston : Drought effectually broken ; marked improvement in general situation ; crops growing rapidly ; corn uneven but making good progress ; rye excellent ; oats fair ; tobacco ahead of season ; meadows and pastures starting up ; hay crop very light on sandy soils, fair yield on damp lands.

Week ending July 10. — New England. Boston : Splendid growing week, very warm, with frequent showers latter half ; drought completely broken ; all crops show decided improvement, especially corn, potatoes, rye and tobacco ; small fruits abundant ; second crop hay promises well.

Week ending July 17. — New England. Boston : Weather very favorable, except heavy rain and high winds did some damage in eastern Maine ; all crops improved and growing rapidly ; haying nearly completed in southern and well advanced in northern half of district ; potatoes, corn and tobacco promise good crops.

Week ending July 24. — New England. Boston : Weather favorable to crops except in eastern Massachusetts, New Hampshire and part of Rhode Island, where drought is again becoming severe ; much hay yet to harvest in northern half of district ; potatoes, corn and tobacco promising ; light to killing frosts in the low lands of Maine and Vermont did little damage.

THE WEATHER OF JULY, 1899.

The weather conditions of July were an improvement on those which prevailed through June. The general showers that occurred during the first week effectually broke the drought that existed through May and June. Seasonable showers continued to fall through the second week and until the 18th of the month, giving favorable weather to growing crops of all kinds. From the 18th to the 25th the showery weather was confined to the western sections of the State, there being nearly an entire absence of precipitation in the eastern counties. There were consequently general complaints of a second drought in the eastern portion of the State at the end of the period mentioned. The dryness was, however, again relieved by copious showers, which prevailed quite generally the night of the 25th and during the 26th. The month, therefore, closes with the soil in fairly good condition for the growth and cultivation of crops. The temperature has averaged somewhat above the mean for the month. It has been devoid of extremes but on the other hand has been well distributed through the days and

nights for the entire month. The thermal conditions as regards agricultural interests have been almost ideal. Local storms, more or less severe, occurred during the month. These were attended by hail, high winds and electrical disturbances which damaged crops and buildings, and in several instances resulted in the loss of life. A fifty-acre field of tobacco at Hadley was badly damaged by hail. At Athol much damage resulted to glass in greenhouses and dwellings. The large percentage of fair weather was decidedly favorable to the harvesting of hay, of which due advantage was taken, and the crop was generally secured in excellent condition. The month of July considered alone was an average summer month, and did much to repair the damage which resulted from the dry weather of the two preceding months.

In the circular to correspondents, returnable July 22, the following questions were asked :—

1. What insects are proving most troublesome in your locality?

2. What is the condition of Indian corn, and what proportion of the crop will be put into the silo?

3. What is the quantity and quality of the hay crop as compared with former years?

4. What forage crops are being raised to supplement the hay crop, for the silo, and to eke out the pastures; what is their condition and are more raised than usual?

5. What is the condition of market-garden crops, including potatoes, and how have those already harvested compared in yield and price with former years?

6. What is the prospect for apples, pears, peaches, plums, quinces, grapes and cranberries?

7. What is the condition of pasturage in your locality?

8. How have rye, oats and barley compared with former years, both as grain and forage crops?

Returns were received from 148 correspondents, from which the following summary has been made : —

INSECTS.

Insects appear to be doing a minimum amount of damage this season. Potato bugs are, as always, fairly plenty, but they are not doing any unusual amount of damage. Other insects reported as doing damage are white grubs, cut worms, squash bugs, lice on peas, grasshoppers, horn flies, elm-leaf beetles, cabbage worms, rose bugs, currant worms, codling moths, fall web worms, onion maggots, plant lice, squash-vine borers, and cranberry vine and fire worms.

INDIAN CORN.

Indian corn has made rapid growth of late, and though still backward in some localities, now generally promises a good crop. There are some complaints of uneven stand and poor color, but these are not numerous enough to indicate any probable shortage in the crop. The proportion that will be put into the silo varies widely in different localities, and often in adjoining towns. As reported last year the proportion used for silage is largest in Worcester County and smallest in the southeastern portion of the State. It is safe to say, however, that a larger and larger proportion of the corn crop is used for silage in all sections each year.

THE HAY CROP.

The rains of the latter part of June helped the hay crop materially in some sections, but came too late to overcome the effects of the earlier drought. At the time of making returns haying was practically completed in all sections. Estimates of the crop vary widely, but the favorite one is from one-half to two-thirds of a full crop. The quality is generally reported as good, and the crop appears to have been secured in first-class condition in almost all cases.

FORAGE CROPS.

The shortage of the hay crop this year has lead to a considerable increase in the acreage devoted to forage crops, particularly in the eastern part of the State. Much old hay is still on hand, and this relieves many farmers from the necessity of putting in forage crops to help out the hay crop. Fodder corn is the crop reported as being most extensively grown for forage, and Hungarian grass, millet, oats and barley follow in the order named. Other forage crops mentioned are oats and peas, rye, barley and peas, millet and peas, spring rape, wheat, soy beans, dwarf mustard, cabbages, mangolds and turnips. The condition of forage crops was generally reported as good, except in the eastern part of the State, where some of these crops were suffering from want of rain at the time of making returns, a condition doubtless relieved by the rains of the 25th-26th.

MARKET-GARDEN CROPS.

Market-garden crops derived material benefit from the heavy rains since the last report, and were nearly up to the normal in condition at date of writing. Prices appear to average about as usual, though perhaps on the whole a little above those of recent years.

EARLY POTATOES.

Early potato harvest has begun in many sections, and the consensus of reports seems to be that while the tubers are large and fair they are few in the hill and that the crop is considerably below the average in quantity. Prices generally rule high and should remain above the average, though there is already a falling off from the prices received for the first digging. No complaints of blight were made and the prospect for the late crop generally appears to be very good.

FRUITS.

As previously noted the prospect is not encouraging for apples, particularly for winter varieties. Pears will also be a light crop, plums very light as a rule, and peaches practically a failure. Quinces will not be more than a fair crop. Grapes generally promise well. The returns are somewhat meagre as to cranberries, but we should judge that the crop now promised well.

PASTURAGE.

In the western and central portions of the State, pastures have improved greatly since the last report, and now promise to generally carry through in good shape, though feed is still rather short. In eastern sections, however, they were, at the time of making returns, still greatly in need of rain and there were many complaints that they had dried up or were drying up. The recent rains should do much to mitigate this condition.

SMALL GRAINS.

The drought of May and June hurt rye, oats and barley in many sections, so that these crops are not as a whole up to the normal, particularly as relates to straw. Their use for grain is rather limited, much more of the acreage planted being cut for hay or forage.

NOTES OF CORRESPONDENTS.

(Returned to us July 22.)

BERKSHIRE COUNTY.

Mount Washington (H. M. WEAVER). — Potato bugs are doing some damage. Indian corn is looking well; we have no silos. The quantity and quality of the hay crop was not up to past years. Fodder corn is the principal forage crop, with the usual acreage. Potatoes are a light crop. There will be a very light crop of all kinds of fruit. Pastures are in good condition. Rye and oats are up to the average or better.

Alford (L. T. OSBORNE). — The condition of Indian corn is very favorable and about one-fifth of the crop will go into the silo. The hay crop is about three-fourths of the usual average. No forage crops are being raised to supplement the hay crop. Potatoes promise well. Apples will be about a one-fourth crop, while pears will not yield over 10 per cent of a normal crop. Pasturage is in average condition. Rye, oats and barley are average crops.

Tyringham (G. F. KOPP). — Cut worms are doing some damage. Corn is looking well and about one-third of it will go into the silo. Hay is about a two-thirds crop of good quality. Millet and corn are being raised as forage crops. Potatoes are looking well and but few have been dug as yet. Apples will be a fair crop. Pasturage is in extra good condition. Rye, oats and barley are good crops. Tobacco is looking well and a considerable number are raising it. Onions are little raised, but are looking well.

Becket (WM. H. SNOW). — Potato bugs are doing some damage. Corn is in good condition and three-fourths of the crop will be put into the silo. The hay crop was about average in quantity and quality. Corn and Hungarian grass are the principal forage crops and are looking well. The prospect for potatoes is good. Apples will be a light crop, pears fair, peaches fair, plums light, grapes good and cranberries good. Pasturage is rather short, but sheep and cattle are doing well. Rye, oats and barley are full average crops.

Richmond (T. B. SALMON). — Potato bugs and cabbage worms are doing some damage. Indian corn is in average condition and

only a small proportion will go into the silo. The hay crop was two-thirds that of last year and was of average quality. Corn and millet are the principal forage crops, condition good, acreage same as usual. Potatoes are a good crop, but are not harvested as yet. Apples will be a good crop, pears light, plums average, quinces average, grapes medium. Pastures are in average condition. Rye, oats and barley are good average crops.

Dalton (W. B. BARTON). — Potato bugs are doing some damage. Corn is in good condition and half of it will go into the silo. Hay is a two-thirds crop of No. 1 quality. Peas and oats, peas and millet, Japanese millet, barley and cabbages are the principal forage crops grown. Market-garden crops are backward with prices favorable. Apples are a two-thirds crop, pears one-third, peaches a failure and plums a two-thirds crop. Pasturage is short. Rye, oats and barley are not up to the average.

Cheshire (L. J. NORTHUP). — Indian corn is looking finely; no silos about here. Hay is about 80 per cent of a normal crop, of fair quality. Millet is being sown to some extent to help out the hay crop and the pastures. Early potatoes are few in the hill; peas quite a good crop. Apples begin to show more than at first, other fruits not plenty. Pasturage is very much improved. Grain compares favorably with former years.

New Ashford (ELIHU INGRAHAM). — Potato bugs are doing some damage. Indian corn is in fair condition, but none of it will go into the silo. The hay crop was off in quantity but excellent in quality. Market-garden crops look well. Potatoes are a light crop with prices good. There will be a fair crop of apples, other fruits a failure. Pastures have come on finely since the rains. Oats are a fine crop.

FRANKLIN COUNTY.

Monroe (D. H. SHERMAN). — The only insects are a very few potato bugs. Very little Indian corn was planted, and it came up uneven and late; no silos here. The hay crop was from 50 to 70 per cent of a full crop, with the quality good. Barley, oats, millet and fodder corn are the principal forage crops. Potatoes look well but are late. There will be few apples, some pears, no peaches, few plums. Pastures are short and dry. Rye, oats and barley are not yet harvested.

Leyden (U. T. DARLING). — Potato bugs are doing some damage. Corn is looking fairly well and about one-tenth of the crop will go into the silo. Hay was about a two-thirds crop, of first-class quality. Corn, oats and barley are the principal forage

crops; condition good, more raised than usual. Potatoes will make fully an average yield. The prospect is poor for all kinds of fruit. The rains have helped the pastures much. Rye, oats and barley are about average crops.

Shelburne (GEO. E. TAYLOR). — Corn is growing very fast and has greatly improved in the past two weeks; one-fourth of the crop will go into the silo. Hay was from half a crop up to an average crop and the quality was very fine. Fodder corn, millet and Hungarian grass are the forage crops grown. Potatoes are looking well, with prices higher than usual. The fruit crop will be very light. Pastures are very short, but the weather has been favorable to growth of late.

Conway (J. C. NEWHALL). — Potato bugs have been more plenty than usual owing to the hot, dry weather. Corn has made rapid growth and is looking finely; not over one-sixth of the crop will go into the silo. The hay crop is about three-fourths that of last year, but the quality is much better. Fodder corn and perhaps some oats and barley are raised as forage crops. Potatoes are about an average crop. There was never as little fruit on the trees at this time of year. Owing to the dry summer, pasturage has been pretty short. Rye, oats and barley are hardly up to the average.

Whately (FRANK DICKINSON). — Potato bugs are doing some damage. Indian corn is late and uneven; only a very small per cent of the crop is raised for silage. The hay crop was rather under the average, but the quality was fine. Corn is grown to some extent as a green fodder crop. Potatoes are looking well, but few are dug as yet. The apple crop will be very small; no pears, peaches or plums; a few quinces and plenty of grapes. Pastures have been short, but are now in good condition. Rye is a fair crop with oats uneven and late.

Sunderland (J. M. J. LEGATE). — Potato bugs are doing some damage. Corn is fully up to the average and half of it will go into the silo. Hay was from two-thirds to three-fourths of an average crop and of very good quality. Fodder corn is the only forage crop raised and no more of that than usual. Potatoes are few in the hill, but large. There will be a very short crop of all kinds of fruit, apples making the best showing. The late rains have freshened pastures up and they are looking well. Rye is good but little raised. Tobacco is very uneven and rather late, with a good many calico plants in almost every crop. Onions promise to be a heavy crop.

Wendell (N. D. PLUMB). — Potato bugs are doing some damage. Corn is somewhat backward, but gives promise for a full crop; one-fourth of it will go into the silo. Hay was about a two-thirds crop,

the late rains proving a great benefit. Fodder corn and Hungarian grass are the principal forage crops. Potatoes never looked better, though there are but very few early ones raised. The severe hail-storm ruined all fruits. Pasturage is in fair shape, the recent rains having revived it wonderfully. Rye, oats and barley are about normal, none being harvested for grain.

New Salem (DANIEL BALLARD).—Potato bugs are doing some damage. The prospect is for a rather light crop of corn; only a small proportion of the crop is put into the silo. The hay crop was below the average in quantity, but was of excellent quality. Corn, oats and Hungarian grass are the forage crops, chiefly the former. Market-garden crops are in good condition, especially potatoes, but not many harvested as yet. There will be a light crop of apples, pears and peaches, but grapes will be plenty. Pastures have much improved since the rains. Rye, oats and barley are fair average crops.

HAMPSHIRE COUNTY.

Greenwich (WM. S. DOUGLAS).—Potato bugs are doing some damage. Indian corn is in good condition; only a very small part of the crop will go into the silo. The hay crop was small, but of fair quality. Oats and fodder corn are the principal forage crops grown. Potatoes are looking finely. There will be but little fruit of any sort. The dry weather has made pasturage short.

Prescott (W. F. WENDERMUTH).—Potato bugs are doing some damage. Corn is looking well for the time of year; there are only two or three silos in town. The hay crop was about two-thirds of an average crop, of very good quality. Corn for dry fodder, and oats, barley and millet are the principal forage crops grown; condition mostly good, acreage increased more than 50 per cent. Early potatoes are rather a light crop. Apples will be a fair crop for the off year. Pasturage is fairly good except where drought killed the grass roots. Rye, oats and barley are average crops.

Hadley (L. W. WEST).—Potato bugs and cut worms are doing some damage. Indian corn is in first-class condition and one-sixth of the crop will go into the silo. Hay was a two-thirds crop secured in the best condition. Corn is the only forage crop raised to any extent. Market-garden crops promise well except that potatoes are late. All kinds of fruit will give light yields. Feed is short in the pastures, but green. Rye, oats and barley are less than average crops.

South Hadley (H. W. GAYLORD).—Potato bugs have been quite thick for the past week. Corn is looking finely and about

one-half the crop of those who have silos will go into the silo. Corn is being raised much more than usual to help out the hay crop as well as for green feed. Potatoes are looking extra well and those dug have given an average yield. There will be a light crop of fruit of all kinds, with grapes the best. Pastures are very short, but stock is looking very well. Rye, oats and barley are average crops.

Hatfield (THADDEUS GRAVES).—Potato bugs are doing some damage. Corn is in fine condition and none of the crop will be used for silage. Hay made a two-thirds crop, of fine quality. No forage crops are being raised to supplement the hay crop and the pastures. Potatoes are a little late but promise fairly. There will be a short crop of all kinds of fruit. There has been plenty of rain lately and pastures are in good condition. Rye, oats and barley are about average crops.

Westhampton (H. A. PARSONS).—Indian corn is in good condition and three-fourths of the crop will go into the silo. Hay was about 85 per cent of a full crop. Ensilage corn is the principal forage crop and is in good condition. Potatoes are looking well. Pastures are in better condition than a month ago. Rye, oats and barley are little raised.

Williamsburg (F. C. RICHARDS).—Indian corn is in first-class condition and one-fourth of the crop will be siloed. The hay crop was about 85 per cent for quantity, with the quality fine; much better than last season. Oats are the principal forage crop with more than usual raised and the condition good. Potatoes promise an excellent crop. Apples are 45 per cent of a full crop; no pears, no peaches, plums fair and quinces good. Pasturage has been good considering the early dry weather. Rye, oats and barley will make good average crops.

Cummington (S. W. CLARK).—Potato bugs are quite numerous. Corn is rather backward, but vigorous; very little will be put into the silo. Moist rich lands produced an average crop of hay of fine quality. Sweet corn is the principal forage crop and is looking finely; acreage about as usual. Potatoes look very well. The prospect for fruit is poor, except for berries, which are abundant. Moist, rich pastures are doing finely, dry ones very poor. Rye, oats and barley are about as usual. July weather has been fine for crops where they had not been injured past redemption by the drought.

HAMPDEN COUNTY.

Blandford (E. W. BOISE).—There has been little damage from insects as yet. Corn is in extra good condition and fully three-fourths of the crop will be used for the silo and for forage.

The hay crop was about three-fourths of the normal and was never better in quality. Potatoes but little dug as yet, but those dug show heavy tops with light tubers; price about average. Apples enough for home use; pears light; no peaches; other fruits light. Pastures are in poor condition, yet stock is doing fairly well. Rye, oats and barley are but little below the average.

Westfield (C. F. FOWLER). — The elm-leaf beetle is working now. Corn is looking well and very little will go into the silo. Hay was about a three-fourths crop and the quality was never better. Some oats have been cut for hay, and more corn has been planted for fodder than usual. Potatoes show very heavy tops, but the tubers are few in a hill. Apples are a light crop; few pears; no peaches; very few plums and few grapes. Pasturage is very short. Rye and oats are about average crops. Tobacco is now being topped and bids fair to be an exceptional crop.

West Springfield (T. A. ROGERS). — Potato bugs and horn flies are proving troublesome. Indian corn is looking well and but a very small part of it will go into the silo. The hay crop was below the average in quantity, but the quality was good. Oats, barley and corn are the principal forage crops; early oats suffered from drought, late sown good; corn is doing well. Early potatoes good; early vegetables hurt by drought; prices about as usual. Apples, pears, peaches and plums will be less than half crops; quinces and grapes full average crops. Pasturage has been short all summer, but has improved since the rains. Rye good; oats and barley below the average. Tobacco is looking about average. Onions will be a light crop on account of seed failing to germinate because of early drought.

Agawam (R. DEWITT). — Potato bugs and rose bugs are doing some damage. Corn is looking fairly well; only a small part of it goes into the silo. The hay crop was somewhat less than usual in quantity, but was of fair quality. Corn is largely grown as a forage crop, and oats and peas are grown a little more than usual this year; all are looking well since the rains. Potatoes are a little under the average in yield, but the price is all right. Few apples; no peaches; all other fruits poor. Pasturage is improving since the rains.

Longmeadow (W. F. EMERSON). — Elm-leaf beetles and potato bugs are doing some damage. Some Indian corn is looking well, much not looking well; very little will go into the silo. The hay crop was perhaps half of a normal crop; quality very good. Very little additional in the way of forage crops has been planted as the overplus of the last few years' hay crops will be used. Potatoes are yielding well with prices about as usual. There is the pros-

pect of a large apple crop ; grapes looking well ; no peaches. Pasturage holds its own very well. Rye is a fair crop, but oats are generally poor.

Wilbraham (F. E. CLARK). — Horn flies are causing cattle some annoyance. Corn has made a remarkable growth during the past few weeks and is looking well ; perhaps one-third of the crop will be put into the silo. Hay was about two-thirds of a normal crop in quantity and full average in quality. Corn, oats, Hungarian grass, millet and barley are all grown as forage crops. Potatoes have been lighter than usual in yield and higher in price. Apples are falling badly, but we may have one-fourth of a crop ; no peaches ; plums, quinces and grapes very few. Pasturage has been short but is doing better since the rains. Rye winter-killed badly, but oats are looking well.

Palmer (O. P. ALLEN). — Excepting the potato bugs there are few insects. Indian corn is in fair condition. The hay crop was from one-half to two-thirds the usual amount and of good quality. Corn and rye are the principal forage crops, condition good, acreage about average. Market-garden crops are very good ; yield and price of potatoes about as usual. The prospect for all kinds of fruit is poor. Late rains have aided the pastures to recover somewhat from the drought of May and June. Rye, oats and barley are about average crops.

Wales (C. F. CRAWFORD). — Potato bugs and rose bugs are doing some damage. Indian corn is looking well. Hay will be a good crop, nearly equal to last year. Corn and oats are raised for forage and their condition is good. Potatoes promise a large crop ; other market-garden crops and prices as usual. Grapes are very plenty ; all other fruits nearly a failure. Pastures are in very good condition. Rye, oats and barley look well.

WORCESTER COUNTY.

Southbridge (G. L. CLEMENCE). — Corn did not come up well and is very backward ; perhaps 25 per cent below the average in condition. Hay was a three-fourths crop, of good quality. Oats, barley and millet are the principal forage crops grown. Potatoes are a good crop. All fruit with the exception of grapes is very scarce. Pasturage is in good condition at present.

Warren (W. E. PATRICK). — Potato bugs are doing some damage. Corn has made a good growth but is very uneven ; proportion for the silo too small to estimate. Ensilage corn, fodder corn, barnyard millet, Hungarian grass and oats and peas are the principal forage crops ; they are all in good condition with double

the usual acreage. Market-garden crops have improved; potatoes are looking well. No apples, few pears, no peaches or plums; prospect good for grapes. Pasturage is very short. Rye is 75 per cent of an average crop and oats 85 per cent.

New Braintree (C. D. SAGE).—Potato bugs are doing some damage. Corn is backward; 10 per cent may be put into the silo. Hay was about a two-thirds crop, of good quality. Fodder corn is the principal forage crop grown and the acreage is about as usual. Few market-garden crops raised, with the exception of potatoes, and no potatoes marketed as yet. Apples 60 per cent of a full crop, pears 50 per cent, no peaches, plums 40 per cent, quinces 75 per cent, grapes 100 per cent, cranberries 50 per cent. Pastures are in good condition. Rye, oats and barley are good average crops.

Petersham (S. B. COOK).—Potato bugs are doing some damage. Indian corn is in good condition and a fifth of it will go into the silo. Hay was about a two-thirds crop, of good quality. Fodder corn is the principal forage crop, though oats and barley are more grown this year than usual. Market-garden crops are in good condition; potatoes yield well with about the usual prices. There will be few apples, peaches and quinces; no cranberries; pears, plums and grapes plenty. Pastures are in fair condition. Rye, oats and barley have all proved heavy crops.

Templeton (LUCIEN GOVE).—Potato bugs are doing some damage. Indian corn is generally in quite good condition, though in some instances it is rather late; 60 per cent of the crop will go into the silo. Hay was about a three-fourths crop, of excellent quality. Oats and peas, barley, Hungarian grass and millet are the principal forage crops and all are rather below the average in condition. Market-garden crops are not up to the average; potatoes are the best, yield light, prices somewhat higher. Very light crop of apples and pears; no peaches; plums light; grapes looking well. Pasturage is quite poor. Winter rye very good, oats and barley rather light.

Hubbardston (C. C. COLBY).—Potato bugs are unusually plenty. Corn is from ten to fifteen days late, but is looking well; fully 70 per cent of the crop will be put into the silo. Hay will be about 80 per cent of an average crop and is of excellent quality. An unusual amount of oats, barley, millet, Hungarian grass and corn have been sown because of the prospect of a light hay crop. Potatoes are looking well and are selling for a dollar a bushel. The apple crop will be very light; pears an average and grapes abundant. Lowland pastures are good, but those on dry ground are a failure. Oats and barley are about three-fourths crop.

Ashburnham (ALBERT NEEDHAM). — Potato bugs are doing some damage. Indian corn is looking fairly well having gained much in the past two weeks; about one-half the crop will go into the silo. Hay is from half to three-quarters of a normal crop, of good quality. Fodder corn, Hungarian grass and barley are the principal forage crops grown. Potatoes are looking well, but none have been harvested as yet. Apples and pears will be light crops. Pasturage is rather short. Rye, oats and barley are about average crops.

Fitchburg (JABEZ FISHER). — Indian corn is in first-class condition and all but a very little of it will go into the silo. There was perhaps 60 per cent of a full hay crop, of fine quality. The yield of market-garden crops is very good and prices are better than usual. Apples will be 25 per cent of a full crop, pears 35 per cent, no peaches, plums 75 per cent, and grapes 95 per cent. Pasturage is in very fair condition.

Harvard (J. S. PRESTON). — Canker worms have done a little damage, but not much. Corn is in good condition but a little short in growth; but few silos in this vicinity. Hay was about two-thirds of an average crop, of good quality. Oats and Hungarian grass are the principal forage crops grown. The yield of market-garden crops has been cut short by the drought. Apples are very scarce, no peaches, pears fair, plums fair, grapes and cranberries not much raised. Pastures look quite green, but the feed is very short. Oats are raised for forage and the yield is short except on low land.

Holden (G. S. GRAHAM). — Potato bugs are very plenty. Corn is uneven, but generally looks well; nearly one-half will go into the silo. The hay crop is about two-thirds of last year's in quantity; quality excellent. Japanese millet, Hungarian grass and fodder corn are the principal forage crops and more were sown late than usual. Potatoes look well generally, but few dug yet. Early and fall apples and pears are quite plenty and grapes look finely. Pasturage is quite short. Oats have done well.

Southborough (E. F. COLLINS). — Tomato worms are doing some damage. Indian corn is rather backward and very little will go into the silo. Hay was about 80 per cent of a full crop, of good quality. More Hungarian grass has been sown than usual and promises well. Early potatoes are a fair crop where well cared for. Apples are a small crop, but the quality promises to be good. Pastures are very dry and feed has not been within 50 per cent of prime condition this year.

Millbury (C. H. STOCKWELL). — Potato bugs are doing some damage on late potatoes. Corn is growing fast and a large pro-

portion of it will be put into the silo. Hay was about two-thirds of a crop, of fair quality. A large quantity of forage crops are being raised; corn, millet and barley being the principal ones. Market-garden crops are in fair condition and potatoes are doing well and bringing good prices. There will be a few apples, pears, quinces, grapes and cranberries, but no peaches. Pastures are in poor condition. Rye, oats and barley are light crops.

Douglas (J. M. RAWSON).—White grubs and potato beetles are doing some damage. The hay crop is a third less than usual in quantity, but is of good quality. Hungarian grass, barley and fodder corn are the principal forage crops and more are grown this year than usual. Potatoes are looking finely, but have not been harvested as yet. The prospect for apples is poor and those on the trees are dropping badly. Pastures are badly dried up. Rye, oats and barley are not as good crops as usual.

Blackstone (O. F. FULLER).—Indian corn looks well, but is a little backward; there is only one silo in town. Hay was from a one-half to a three-fourths crop, with the quality a little off. Fodder corn has been largely planted, also oats and millet. Tomatoes and sweet corn are being marketed. Potatoes are not yielding as well as usual. There are very few apples in this section, also few pears, plums or quinces. Pasturage is in poor condition and some of our farmers are feeding winter rations of grain. Oats are reported to be a good crop. Onions not up to the average.

MIDDLESEX COUNTY.

Marlborough (E. D. HOWE).—Corn is in fair condition and about three-fourths of the crop will go into the silo. Hay was 60 per cent of last year's crop in quantity and of first-class quality. Millet and Hungarian grass are the principal forage crops grown; condition fine, a little more raised than usual. Market-garden crops need rain. Early potatoes are just being dug and are selling for 90 cents and \$1 per bushel. Apples will be 25 per cent of a full crop, pears half a crop, peaches 5 per cent, plums 10 per cent, quinces 10 per cent and grapes 75 per cent. Pasturage is getting short and dried up. Rye, oats and barley are grown mostly for forage and are about three-fourths of the average.

Maynard (L. H. MAYNARD).—Potato bugs are doing some damage. Indian corn looks well and three-fourths of it will be put into the silo. The hay crop was a little below the average in quantity, but of good quality. Millet and Hungarian grass are the principal forage crops, condition normal, more raised this season than usual. Market-garden crops are about average; potatoes good

crop. Apples half a crop; pears and plums plenty; peaches short; quinces half a crop; grapes and cranberries plenty. Pasturage is about normal in condition. Rye, oats and barley are about normal crops.

Westford (J. W. FLETCHER). — No insects are doing any damage at this time. Indian corn is in good condition. Hay was about two-thirds of a full crop. Corn, Hungarian grass and barley are the principal forage crops grown. Potatoes are looking well and will prove a good crop. Fruit of all kinds is very scarce. Pasturage is all dried up. Rye, oats and barley are about average crops.

Pepperell (P. J. KEMP). — Potato bugs are doing some damage. Corn is looking well and not over 5 per cent of the crop will go into the silo. Hay was about a three-fourths crop, of good quality. Corn is the leading forage crop, followed by barley, Hungarian grass and rye. Market-garden crops are looking well now; potatoes extra, none dug as yet. The fruit crop is almost a total failure. Pastures are very short.

Tewksbury (G. E. CROSBY). — Cut worms are doing some damage. Indian corn is in fair condition. The hay crop is about two-thirds of an average crop and the quality is for the most part good. Oats and Hungarian grass are the principal forage crops, but they are no more grown than usual. Market-garden crops are doing fairly well. Potatoes are of good size and quality, but the yield is light. The prospect is very poor for all kinds of fruit. Pastures are dry. Rye, oats and barley are about three-fourths crop.

Concord (W. H. HUNT). — Corn is looking well and about the usual proportion will be put into the silo. Hay will be three-fourths of a normal crop, of good quality. Oats, millet and barley are the usual forage crops and are doing well. Potatoes are of good quality, but the yield is below the average. No peaches, not many plums; grapes doing well; very few apples; pears half a crop. Pastures have suffered from dry weather. Rye, oats and barley are below average crops.

Lincoln (SAMUEL HARTWELL). — Cut worms have done some damage. The quantity of the hay crop was much below the average, quality good and it was well secured. Fodder corn, millet and Hungarian grass are the principal forage crops grown, with about the usual acreage of each. Market-garden crops need rain badly, though they have looked well; prices better than usual. Pears, quinces and grapes look quite well; apples, peaches and plums are scarce. Pasturage is short. Rye, oats and barley look well on moist land, otherwise dry. The prospect for the second crop of hay is far from good.

Woburn (W. H. BARTLETT).—Cut worms, potato bugs and squash bugs are doing some damage. Sweet corn is the only kind of corn raised and is looking well. Hay was perhaps a two-thirds crop, of good quality. Hungarian grass and barley are the principal forage crops, with a slightly increased acreage. Market-garden crops have been light, but prices have been good. Winter apples are very scarce; few pears; no peaches; very few plums and quinces; grapes fair. Pastures are very dry. Rye headed out rather light.

Winchester (MARSHAL SYMMES).—We are very free from troublesome insects just now. Hay was about half a crop and was secured in good order. Market-garden crops are now drying up. Potatoes are ready to dig. Everything is suffering for rain and is being pinched by the hot winds that have prevailed most of the season. Pasturage is entirely dried up. Rye is a fairly good crop.

Newton (OTIS PETTEE).—On moist lands corn is looking very well with the promise of a fair crop. The hay crop is very light and of poor quality owing to drought. There is a considerable acreage of corn planted for the silo and for forage and it is doing well. The prospect is good for late potatoes, but early ones are few in the hill. There are but few apples, but pears are more plenty. Pastures are very dry indeed.

ESSEX COUNTY.

Salisbury (WESLEY PETTENGILL).—Potato bugs are doing considerable damage. Corn is good except on high ground, where it has suffered from drought; none is put into silos. Hay was about a two-thirds crop and the quality was never better. Rather more barley and fodder corn are being raised for forage than usual and they are in fair condition. Potatoes are not yielding as well as some years, but prices are good. Apples will be a very light crop; pears light; peaches none; plums light; grapes good. Pastures are in poor condition and have been all the season. Rye, oats and barley are little raised for grain, but are fair average crops.

Haverhill (EBEN WEBSTER).—Potato bugs are doing some damage. Indian corn is in good condition and about three-fourths of the crop will be put into the silo. Hay was about a three-fourths crop, of fair quality. Oats, rye, barley, corn and Hungarian grass are the principal forage crops grown and are in fair condition. Most market-garden crops give good yields, with prices about as usual. Apples and pears will give small crops; grapes plenty.

Pastures are a little short owing to drought. Rye, oats and barley are very good as forage crops, but are not much grown for grain.

Groveland (ABEL STICKNEY). — Corn is looking finely, with about 20 per cent of the crop destined for the silo. The hay crop was nearly up to the average of the past ten years and its quality was never better. Fodder corn is the principal forage crop, with some oats and barley and a little rye; probably the acreage is slightly increased. Potatoes are small, but market-garden crops generally look well. Apples are very poor; pears good; peaches poor; plums fair; quinces a light crop and grapes looking well. Pasturage is short and water low. Rye, oats and barley are cut for hay and were not up to the average.

Ipswich (O. C. SMITH). — Potato bugs and squash bugs are doing some damage. Corn has grown fast the last fortnight and promises a fair crop; few silos in town. Hay was a half crop on uplands and an average one on lowlands. Millet, fodder corn, peas and oats and Hungarian grass are the forage crops grown and promise fair crops; acreage 10 per cent more than usual. Market-garden crops are good, with the exception of early potatoes, which show a small yield; prices about as usual. Apples a poor crop; pears fair; peaches, plums and quinces small; grapes and cranberries full crops. Pasturage is very low, the drought having damaged the grass roots. Rye and barley are fair crops. Onions promise a fair crop.

Topsfield (B. P. PIKE). — The pea louse is doing some damage. Indian corn looks fairly well and one-tenth of the crop will go into the silo. Hay was a two-thirds crop, of very good quality. Hungarian grass, barley and fodder corn are the principal forage crops, condition fair, acreage somewhat increased. Potatoes are not as good a crop as usual. The fruit crop will be light for all kinds. Pasturage was never in worse condition. Rye, oats and barley are much below average crops.

Andover (M. H. GOULD). — Potato bugs are doing some damage. Corn is not up to the average owing to dry weather; four-fifths of the crop will go into the silo. Hay was about a three-fifths crop, of good quality. Oats and peas, barley and fodder corn are the principal forage crops; condition 50 per cent off from the normal; acreage of fodder corn increased. Market-garden crops are generally light, with prices above the average. No apples; other fruits light; grapes and cranberries looking well. Pastures are all dried up and there is hardly any feed. Rye, oats and barley are very light crops. Onions are looking well now. Cucumbers for pickling are doing well.

NORFOLK COUNTY.

Franklin (C. M. ALLEN). — Indian corn is not in as good condition as usual; not over 10 per cent of the crop will go into the silo. Hay was a three-fourths crop, of very good quality. More than the usual amount of ground has been devoted to forage crops this season, and millet and late barley are looking well. Market-garden crops have given light yields owing to dry weather, with prices average. Apples and pears light; no peaches; plums and quinces few; grapes and cranberries good. Pastures are dried up. Rye, oats and barley are light crops.

Norfolk (G. E. HOLBROOK). — Potato bugs and plant lice are doing some damage. Corn is backward for the time of year and but little will go into the silo. Hay was about two-thirds of a full crop, of good quality. Millet, Hungarian grass and fodder corn are the principal forage crops, condition good, more than usual sown. Market-garden crops are looking well and potatoes are a good crop. Apples about a fourth of a crop; some pears and grapes; cranberries a good crop. Pasturage is very poor and cows are shrinking badly. Oats headed out when the fodder was very short; not much barley raised; rye good.

Norwood (F. A. FALES). — Potato bugs are doing some damage. Indian corn is in good condition and about 20 per cent of the crop will go into the silo. Hay was a little less than half a crop, of fair quality. Fodder corn and Hungarian grass are the principal forage crops grown and about 50 per cent more Hungarian grass than usual has been sown. Market-garden crops made light yields, with prices about as last year. All fruit will give short crops except cranberries, which are looking well though about two weeks late. Pastures are very dry. Rye and oats were very light crops, with barley fair.

Canton (E. V. KINSLEY). — Potato bugs are doing some damage. Indian corn is growing finely but is still backward; about half the crop will be put into the silo. The hay crop was below 50 per cent in quantity, but was of excellent quality. Fodder corn, Hungarian grass and millet are raised as forage crops, condition good, acreage twice that usually planted. Late market-garden crops are doing well; potatoes a fine crop; prices high. Early apples good; late apples a failure; pears a fair crop; other small fruits of no account; cranberries look well. Pasturage is dried up on uplands, lowlands fair. Rye, oats and barley have done well.

Sharon (E. E. NARAMORE). — There has been some complaint of corn not coming up well, but that which did come up is looking well; little Indian corn planted except for silage. Hay was a

little less than half a crop, of good quality. Corn, oats and Hungarian grass are the principal forage crops and they will be grown more extensively than usual this year. All market-garden crops are short; where potatoes were planted on moist land the yield will be good. Apples will give a poor crop; pears fair; grapes plenty; cranberries looking well. Pasturage is in poor condition. Rye, oats and barley did not make over half crops owing to the dry weather.

Stoughton (C. F. CURTIS). — Indian corn is looking very well and three-fourths of the crop will go into the silo. Hay was from one-third to one-half of a normal crop, of fair quality. Hungarian grass, Japanese millet and barley and peas are the forage crops grown and are in good condition. Apples and pears will give poor crops; quinces and grapes good; cranberries blossomed well. Pastures are burned up and played out. Oats cut for hay made a fair yield.

BRISTOL COUNTY.

Mansfield (WM. C. WINTER). — Rose bugs have been our most troublesome insect. Indian corn is in good condition; none of the crop is used for silage. Hay was a two-thirds crop, of excellent quality. Fodder corn and Hungarian grass are the principal forage crops grown. Market-garden crops generally yield well; prices about as usual. Apples and pears promise about a third of a crop; peaches a full crop in sheltered spots, elsewhere none; Japan plums full crop; other plums small crop; grapes full. Rye, oats and barley were fair crops for grain, but light for forage.

Norton (WM. A. LANE). — Potato bugs are doing some damage. Indian corn is looking well; no silos here. Hay was about half a crop, of fair quality; prospect good for second crop. Millet and Hungarian grass are the principal forage crops grown. Market-garden crops are in good condition; potatoes large and not many in a hill. Very few apples are grown here. Pasturage is fairly good now. Rye did not fill out well; oats are looking well; barley blighted.

Dighton (J. N. PAUL). — Cut worms and potato bugs are doing some damage. Indian corn is in good condition; but a small part of the crop will be put into the silo. Hay was about half a crop, of poor quality. Hungarian grass, corn and barley are the principal forage crops, condition good, more raised than usual. Market-garden crops are good; potatoes give a good yield, with prices good. Apples a fair crop; pears poor; peaches and plums fair; not many grapes and cranberries. Pasturage is in good condition. Rye, oats and barley are good crops. Strawberry beds are mak-

ing a fine growth, but the acreage is much less than in former years. Onions are looking well.

Berkley (R. H. BABBITT). — White grubs and the pea louse are doing some damage. Indian corn is looking well; but very little will go into the silo. Hay was about half a crop, of good quality. Corn fodder, millet and barley are the principal forage crops. Potatoes are a light crop, with prices good. Apples fair; pears good; no peaches; plums few; quinces few; grapes plenty and cranberries average. Pasturage is in very good condition. Rye, oats and barley are below average crops. Strawberries were a very light crop.

Acushnet (M. S. DOUGLAS). — White grubs are working badly on potatoes. Corn is looking well; no silos in this locality. Hay was from one-third to one-half of a normal crop, with the quality not up to the average. Farmers are putting in fodder corn and millet quite extensively and they are in good condition. Potatoes are running small, but prices are fully up to the average. Very few apples, pears or peaches; plums and quinces fair; a good show of grapes. Pastures are in poor condition. Rye was a good crop, oats and barley short.

PLYMOUTH COUNTY.

Brockton (DAVIS COPELAND). — Green flies and squash bugs are doing some damage. Indian corn is in good condition and 25 per cent of the crop will go into the silo. Hay was about half a crop, of very good quality. Fodder corn and Hungarian grass are the principal forage crops, condition very good, rather more raised than usual. Market-garden crops are looking fairly well, with prices about average. The prospect for apples, pears and peaches is poor. Pasturage is short, but is starting up green since the rains.

Bridgewater (ROWLAND CASS). — Cut worms and white grubs are doing some damage. Indian corn is in good condition, very little used for silage. Hay was not over half a crop, of good quality. Fodder corn and Hungarian grass for forage are in good condition, oats below the average, more raised than usual. Potatoes are looking well. Apples are less than an average crop; pears good; some quinces. Pasturage is in poor condition. Rye, oats and barley are below the normal in yield.

Kingston (GEO. L. CHURCHILL). — Potato bugs are doing some damage. Indian corn will be a small crop and two-thirds of it will go into the silo. Hay was a half crop, of good quality. Corn and millet are the principal forage crops raised and are looking

fairly well. Potatoes are a poor crop. Pasturage is in poor condition, but is improving. Rye, oats and barley are fair crops.

Carver (J. A. VAUGHAN). — Potato bugs are doing some damage. Indian corn is in good condition; no silos in this vicinity. Hay was about half a crop; most of it was secured in good order, but is light and fine, with little top or body. Millet and Hungarian grass are the principal forage crops raised, condition good, acreage increased. But few apples and pears; no peaches; cranberries looking well on most bogs. Pasturage is in fair condition. Rye, oats and barley are average crops.

Mattapoisett (A. R. SWIFT). — White grubs and pea lice are doing some damage. Indian corn is in good condition and none of the crop will be used for silage. Hay was about half a crop. Fodder corn and barley are the principal forage crops, condition good, acreage more than usual. Market-garden crops are in fair condition, with prices about average. Apples good; pears few; peaches good; plums and quinces few; grapes and cranberries fair. Pasturage is in good condition. Rye, oats and barley are about average crops.

BARNSTABLE COUNTY.

Sandwich (J. R. HOLWAY). — White grubs are doing much damage to crops, pastures and mowings. Corn is in good condition; none used for silage. Hay was about one-fourth of last year's crop, but of good quality. Fodder corn and millet are the principal forage crops, condition good, more than usual raised. Early potatoes are small, late ones good. There will be a good crop of all kinds of fruit except pears. Rye, oats and barley are all very short crops.

Dennis (JOSHUA CROWELL). — Cranberry vine worms and potato bugs are doing some damage. Indian corn is about an average crop though perhaps a little backward; no silos. Hay is about half a crop, of good quality. Oats, Hungarian grass and corn are the principal forage crops, condition good, more raised than usual. Potatoes are looking well, none harvested. Apples and pears will be average crops; grapes plenty; cranberries medium. Pastures have improved much during the month.

Chatham (E. Z. RYDER). — Potato bugs and squash bugs are abundant. Indian corn is in fine condition; but very little will be put into the silo. The hay crop was a failure, not over a fourth of a crop. Forage crops are very little grown here. Market-garden crops are a little off, prices much the same as in former years. Apples, pears, peaches, plums and quinces are raised but little; some grapes and cranberries. Fall pasturage promises well

with rain. Oats are looking finely. Onions are doing well, with some increase in acreage. Cranberries are looking well, with some complaint of insects.

Eastham (J. A. CLARK). — Very little corn is planted except for fodder; no silos. Hay was a light crop, of good quality. Fodder corn and Hungarian grass are the principal forage crops and are in good condition. Market-garden crops are looking well at present. Apples promise a moderate crop; cranberries fine. Pasturage is in fair condition. Asparagus is looking well, no rust as yet.

Truro (D. E. PAINE). — Potato bugs are doing some damage. Indian corn is very little raised. The hay crop was short. Oats and millet are the principal forage crops, condition good, and about the usual quantity raised. Market-garden crops are rather below the average. The prospect is fair for all kinds of fruit. Pastures are in good condition. Rye, oats and barley are very little raised.

DUKES COUNTY.

West Tisbury (GEO. HUNT LUCE). — White grubs and squash-vine borers are doing some damage. Indian corn is below the average and we have no silos. Hay was from one-fourth to one-half of a crop, of good quality. Hungarian grass is the principal forage crop grown, more sown than usual and prospect good. Market-garden crops are below the average in condition, with prices high. The prospect is good for grapes and apples. Pastures are in very good condition. Oats headed out well, but the straw was short.

NANTUCKET COUNTY.

Nantucket (C. W. GARDNER). — Potato bugs are doing some damage. Corn is looking fairly well; no silos here. Hay was about a third of a crop, of excellent quality. There is a great acreage of fodder corn this year. Market-garden crops are very good; prices for potatoes \$2 per bushel. The prospect is poor for all kinds of fruit. Owing to the drought, pasturage is not as good as commonly. Rye, oats and barley are about half crops.

BULLETIN OF MASSACHUSETTS BOARD OF AGRICULTURE.

THE ELM-LEAF BEETLE IN MASSACHUSETTS.

By A. H. KIRKLAND, M.S., *Assistant Entomologist.*

In many localities in Massachusetts the imported elm-leaf beetle* has proved a pest of the first rank, and while but a recent accession to our insect fauna, apparently has come to stay. Since 1895 its depredations in the Connecticut Valley have given it considerable local notoriety, and last year at Groton, it duplicated the damage caused at Springfield and Northampton.

That this insect will prove a serious pest in the near future in many of our larger cities seems the only conclusion to be drawn from the experience of other States, notably New York and Connecticut. It attacks and, if neglected, kills our most valuable species of shade tree and is slowly but surely spreading over the State. In the present paper the writer aims to set forth the essential facts concerning the insect in order to aid citizens, and more especially park officials, in detecting and combating it wherever it may occur.

A EUROPEAN INSECT.

Like many of our most dangerous insect pests, the elm-leaf beetle is an importation from Europe. Dr. E. P. Felt, State entomologist of New York, who has made quite an extensive study of the literature on this insect, is authority for the statement that it is chiefly injurious in the southern portions of France and Germany and in Austria and Italy, although it is generally distributed over a large part of Europe. The first record of damage by this insect in America is that given by Harris, who says that in 1838 and 1839 it stripped the elms in Baltimore, Md., and vicinity. It is generally conceded that the beetle was introduced in that locality some years previous through the importation of European elms. Since that date the beetle has gradually spread

* *Galerucella luteola* Møller.

southward to North Carolina, westward over the Alleghany mountains into West Virginia, and northward to the New England states, causing severe damage, particularly to city elms.

OCCURRENCE IN MASSACHUSETTS.

The elm-leaf beetle appears to have entered Massachusetts from the south several years ago, and has gradually spread northward along the Connecticut and Housatonic rivers. A lateral diffusion of the insect is now taking place in the valleys of the streams contributing to these rivers, and probably along the main lines of our railroads. In Berkshire county, severe injury has been caused by the insect at Sheffield and Great Barrington. Mr. H. L. Frost informs me that the beetles are fewer in number and the damage much less in extent at Stockbridge and Lenox, although these towns are more or less infested. The damage to the elms at Springfield has been previously mentioned. Here the insects were injuriously abundant in 1895, their depredations continuing to the present time. In the same year Dr. L. O. Howard found the beetle abundant at Holyoke and Northampton, and in smaller numbers at Miller's Falls. Prof. C. H. Fernald found it at Amherst in 1895.

At the present writing the beetle has spread westward along the Westfield river to West Springfield and Westfield, and along the Mill river to Williamsburg, in each of which towns it was locally injurious in 1898. In the present year outbreaks of the insect have developed at Longmeadow and at Chicopee.

Previous to 1898 eastern Massachusetts escaped damage by the elm-leaf beetle. So far as known to the writer the only specimens of the insect taken in this region before 1898 were the ones found by Prof. F. M. Webster "north of Salem" in 1895, by Frank A. Bates at Winthrop in 1896, and by the writer at Plymouth in the latter year. That the insect has not been seriously injurious in Boston and its older suburbs has been a matter hard to understand, for the many compact plantings of English elms in this region offer ideal conditions for the insect's development, while the numerous railroads terminating here afford ready means for its transportation. It seems, however, that we are not always to remain free from injury by this pest, for in 1898 a severe outbreak occurred at Groton, only thirty miles to the northwest of Boston, while the insect was also abundant, though in less numbers, at Ayer on the main line of the Fitchburg railroad. During the present season the writer has taken the beetles at Malden, while Mr. A. F. Burgess found a number of the larvæ at Newton, near

Brookline, on trees bordering the Newton boulevard. It will be surprising indeed if the insect does not appear in injurious numbers in Boston and vicinity in the course of a few years.*

LIFE HISTORY.

The mature beetles pass the winter in various sheltered places, under clapboards, in buildings, etc., in some cases crawling into houses in such great numbers as to cause much annoyance. In this region they emerge from the first to the middle of May and feed greedily upon the elm, eating innumerable shot holes in



FIG. 1. Different stages of the elm-leaf beetle: *a*, eggs; *b*, larvæ; *c*, adult; *d*, eggs enlarged; *e*, sculpture of eggs; *f*, larva enlarged; *g*, side view of greatly enlarged segment of larva; *h*, dorsal view of same; *i*, pupa enlarged; *j*, beetle enlarged; *k*, portion of wing-cover of beetle greatly enlarged. From Riley, Report U. S. Dept. Agri., 1883.

unfolding leaves. Egg-laying commences in a few days and extends over several weeks. Of two female beetles observed by Dr. Felt, one deposited 431 eggs in 27 days, the other 623 eggs in 28 days. The eggs are spindle-shaped, orange-yellow in color and are laid in irregular rows on the undersides of the leaves in

* Since the above was written the elm-leaf beetle has caused serious damage at Worcester, Hudson, Auburndale, Framingham, Lawrence, Salem and Quincy.

much the same manner as the eggs of the potato beetle, an allied insect. The young larvæ emerge in about one week (from late in May to the middle of June) and attack the under surface of the leaves, gnawing away the epidermis and causing the leaves to turn brown. From two to three weeks are required for the completion of the larval stage, at the end of which period they are about one-half an inch in length, of a yellowish color, with a dark brown or black stripe on either side. They then descend to the rough bark of the tree or to the ground and transform to pupæ. From five to ten days are spent in the pupal stage, varying according to the temperature, when the mature beetles emerge, feed, pair, and lay eggs for a second brood which matures in the late summer. The beetle is from one-fourth to three-eighths of an inch in length, pale yellow with a black stripe on the outer part of each wing-cover. I have not been able to observe the transformations of the second brood, but there can be no doubt that there is such a brood in this State, since on July 1 of the present year, pupæ were found at Springfield, and at the present writing, July 8, many beetles are emerging.

FOOD PLANTS.

This insect feeds upon both the European and the American elm, naturally preferring the former. In many cases, notably at Northampton, where European elms stand in close proximity to American elms, the former are badly injured while the latter are practically unharmed. Where the European elm is not available, however, the American species is readily attacked and severely injured. At Groton, last summer, numbers of large American elms were so severely injured that they were as brown as if scorched by fire. At Springfield several American elms that were stripped three years in succession are now in a dying condition. Dr. Felt states that the Scotch elm also suffers seriously from the attacks of this insect.

Nature of the Damage.—The first injury to the tree is caused by the attack of beetles on the leaves. Later the larvæ destroy the epidermis, the leaves turn brown, die and fall, and the tree is left bare until a second crop of leaves is thrown out. Frequently these leaves are in turn destroyed by the later brood of larvæ. The effect upon the tree is shown by the gradual death of the smaller branches, and of the entire tree in cases of severe and continued stripping. City trees through ignorant or careless treatment commonly suffer from lack of food and water supply due to the cutting off of roots to make room for curbs and water and

gas mains. Such trees have but little reserve vitality and are easy victims to damage by the beetle. The weakened condition of trees defoliated by the elm-leaf beetle invites or favors attack by other insects, notably borers, bark beetles and the elm-bark louse.

NATURAL ENEMIES.

Several species of predaceous beetles are known to attack this insect. In Massachusetts two species of soldier bugs (*Podisus serieiventris* and *P. placidus*) are its most common enemies. These beneficial little bugs frequent the infested trees and prey upon the larvæ and pupæ.*

REMEDIES.

In combating the elm-leaf beetle the chief reliance should be placed upon the use of arsenical insecticides, and of these the most satisfactory is arsenate of lead, which should be used at the rate of 5 to 10 lbs. (actual arsenate of lead) to 150 gallons of water. Its preparation and application are discussed on another page.

The first spraying should be in May or early in June while the beetles are feeding. This treatment, as has been shown by Mr. C. L. Marlatt, is very efficacious, since by destroying the mature beetles, egg-laying and the consequent development of larvæ are prevented. Later, when the larvæ have appeared and the main body of the foliage has developed, a second application should be made. This, if thorough, may suffice for the season, although in some cases a third spraying may be necessary for the second brood. In all cases the insecticide should be used in liberal quantities.

With rough barked trees many of the larvæ pupate in the crevices on the trunk and even far up in the tree, hence scraping the bark is advisable. This will cause the larvæ to descend to the ground to pupate, where they will be found massed in great numbers at the base of the trees, under or along the bottom rails of fences nearby, and in other convenient spots. In this stage they may be destroyed by kerosene emulsion applied to the trunks and to the ground beneath the trees.

Spraying Outfits. For use in parks or cities where large numbers of trees are to be sprayed, a power-spraying outfit will be found the most satisfactory. This consists of a small engine with suitable pump, mounted on a substantial one-horse truck which also carries the spraying tank and supplies. There are several

* At Squantum, July 12, a third species of predaceous bug (*Stiretrus anchorago*) was found feeding upon the larvæ of the elm-leaf beetle.

styles of small engines suitable for this purpose, but the writer is of the opinion that gasoline engines are the most economical as well as being cleaner and more easily attended. City Forester Gale of Springfield, informs me that the gasolene engine used by him in spraying is operated at a cost for fuel of one cent per hour. The pump should supply at least two lines of hose and should have a release valve or "blow-off" to save strain on lines of hose temporarily out of use. The tank should be cylindrical with adjustable hoops so that shrinking of the staves may be taken up. Square or rectangular tanks are much less durable than cylindrical ones.

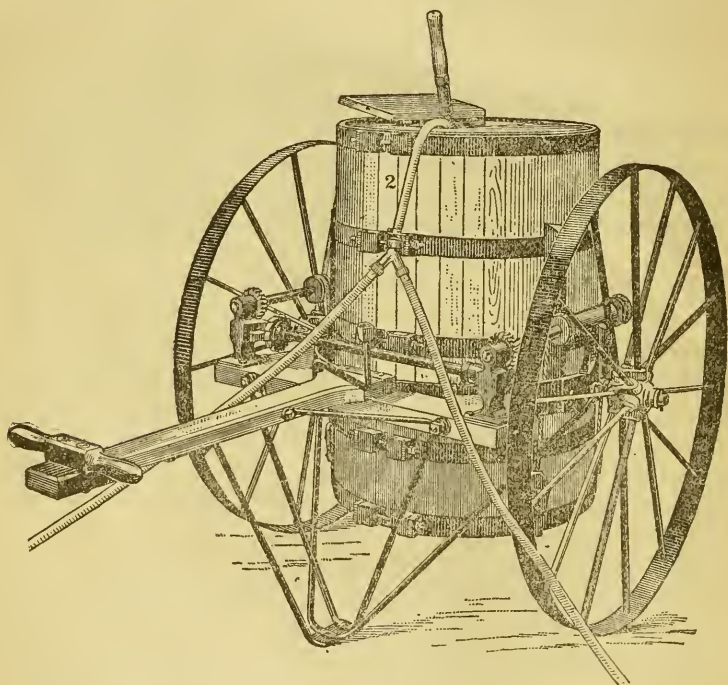


FIG. 2. Spraying outfit used in operations against the gypsy moth. From Forbush, Rept. Mass. Bd. of Agri., 1898.

Several large hand outfits may be substituted for a power sprayer, and when this is desirable an outfit similar to those used by the gypsy moth committee is recommended. This is composed of a 100-gallon tank mounted in a two-wheeled truck and containing a powerful pump placed within the tank (Fig. 2).

A smaller spraying outfit may be prepared by mounting a suitable pump on a barrel or cask, the whole being fastened in a wagon or cart. Among other pumps used for this purpose the "Deming" pump is perhaps as satisfactory as any.

For use in spraying there is nothing better than the one-quarter inch hose with improved couplings (Fig. 3), invented by Mr. E. C. Ware of the gypsy moth force. It is light, strong and the couplings cannot be forced off. No feature of spraying operations is more exasperating or expensive than the frequent delays caused



FIG. 3. One-quarter inch hose with improved coupling. From Forbush, Rept. Mass. Bd. of Agri., 1893.

by the loosening and leaking of couplings. With the small hose and couplings figured herewith these factors are eliminated. For spray-poles use a one-quarter inch iron gas pipe, 10 feet long, encased in wood, with a coupling at one end for the hose and at the other for the nozzle.

In spraying operations against the elm-leaf beetle the end to be desired is the thorough covering of the foliage, *particularly the under surface*, with a mist-like spray. • For this reason nozzles that throw a stream are undesirable as well as being wasteful of the spraying mixture. In our work against the gypsy moth we have found the four-way modified Cyclone nozzle (Fig. 4), to give the most satisfactory spray. Other good nozzles are the Vermorel and Cyclone.

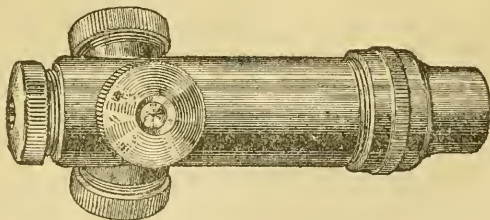


FIG. 4. — Improved four-way nozzle. From Forbush, Rept. Mass. Bd. of Agri., 1893.

It is not necessary to use glucose to cause arsenate of lead to adhere to the foliage. Experiments made under the direction of the gypsy moth committee have shown that no substantial gain is made by the use of glucose, a result that has been confirmed by the independent investigations of City Forester Gale at Springfield.

Arsenate of Lead. — This insecticide is now generally used against the elm-leaf beetle and possesses the merits of being harmless to the foliage and of adhering to it in an effective condition for a long period. It is prepared by mixing a solution of arsenate of soda with a solution of acetate or nitrate of lead, when arsenate

of lead is formed as a curdy white precipitate. The following table adapted from Smith* shows the necessary amounts of the ingredients where acetate of lead is used:—

ARSENATE OF LEAD DESIRED.	ARSENATE OF SODA (65%).		WHITE ACETATE OF LEAD.	
Lbs.	Lbs.	Oz.	Lbs.	Oz.
1	—	9½	1	5
3	1	11¼	3	15
5	1	13⅓	6	9
10	5	10⅝	13	2

Using nitrate of lead the following amounts of ingredients are necessary:—

ARSENATE OF LEAD DESIRED.	ARSENATE OF SODA (65%).		NITRATE OF LEAD.	
Lbs.	Lbs.	Oz.	Lbs.	Oz.
1	—	10¾	1	4½
3	2	—	3	13½
5	3	5½	6	6½
10	6	10⅔	12	13

The use of 50 per cent arsenate of soda is not recommended when the 65 per cent can be purchased at a fair price, since the former product is generally adulterated with common salt. Where large quantities of arsenate of lead are to be prepared it will be advisable to buy as high grade commercial arsenate of soda as possible, and to have a chemist determine the amount of acetate or nitrate of lead required for use with it.

The quantity of arsenate of lead to be used as a standard charge for the spraying tank having been decided upon, the ingredients necessary to make this quantity are determined. It will be desirable to make two ballasts, equal in weight respectively to that of the arsenate of soda and the acetate or nitrate of lead, in each case plus the weight of the scoop on the balance scales used. These ballasts may be made of glass jars filled with shot and by their use the ingredients may be accurately weighed, when they should be placed in stout paper bags, each package of arsenate of soda being tied inside of the corresponding package of the lead

* For an excellent and comprehensive treatise on the preparation of arsenate of lead, see article by F. J. Smith in Report, Gypsy Moth Committee, January, 1898, pp. 57-69.

salt. In this way compact, convenient packages of the insecticide may be rapidly prepared. When desired for use the arsenate of soda should be dissolved in a wooden tub, the acetate of lead being dissolved in a separate tub. The two solutions are then poured into the spraying tank and the arsenate of lead is ready for use. The ingredients should never be dissolved in metallic vessels.

It is a good plan to first test the formula used, by mixing a trial lot of arsenate of lead and allowing it to settle in the mixing tub. A few drops of chromate of potash solution added to the clear liquid which separates above the arsenate of lead should cause the formation of a yellow precipitate. This indicates that an excess of soluble lead is present and consequently that all the soluble arsenic has been neutralized. A firm of manufacturing chemists, located at Boston, has this year placed upon the market an excellent brand of arsenate of lead in paste form, thus saving the delay incident to the preparation of the insecticide.

Kerosene Emulsion. This insecticide is prepared by dissolving one-fourth pound hard soap in two quarts hot water and adding to the soapsuds thus formed one gallon kerosene oil. The whole is stirred or churned until cool, when a white, creamy emulsion is formed. This emulsion should be diluted with nine parts of water. Kerosene emulsion kills by contact, and is a valuable agent for killing the larvæ and pupæ of the elm-leaf beetle clustered in the bark or in masses on the ground under the infested trees.

USELESS MEASURES.

In cases of extensive injury by the elm-leaf beetle, individuals often spend in useless channels a large amount of energy which intelligently applied would be productive of good results. Among the more common mistakes are : —

Tar Bands. — These serve to prevent damage by the canker worm by intercepting the wingless female moth on her way up the tree to deposit eggs. The female elm-leaf beetle *flies* into the tree, hence these bands are valueless against this insect.

Cotton Bands. — The considerations mentioned above apply to cotton bands.

Sulphur Plugs. — Nothing better illustrates the credulity of mankind, than that sons of Belial still find victims who are willing to pay for the plugging of trees with sulphur to ward off insect damage. It is needless to say that this treatment is a swindle pure and simple, and that money spent for this purpose is but charity given to unworthy objects.

Kerosene. — Valuable elms are frequently killed by the use of pure kerosene on the trunks as a means of destroying the pupæ. The oil accumulates at the base of the tree and where used in quantities, kills the roots. By substituting kerosene emulsion for kerosene all danger will be avoided.

Street Sweepings. — The sweeping up and carting away of the masses of pupæ and larvæ along with the other rubbish of the streets is not an uncommon sight in infested cities. In a case observed by the writer in July, 1898, quarts of the pupæ were carefully swept up in a public square and carted to the city dump. In all such cases the sweepings should be burned or treated with crude petroleum or kerosene emulsion.

GENERAL CONSIDERATIONS.

Outbreaks of the elm-leaf beetle are best dealt with by municipalities through the city forester, the park or the street department. When feeding upon park and street trees the pest attacks the common property of the citizens, and all may properly share in the expense of combating it. With suitable apparatus and insecticides, and competent men to make use of them, the elm-leaf beetle can be kept under control and the infested trees preserved from serious injury. The general plan adopted by the city of Springfield is a most excellent one. Liberal appropriations are made by the city to be expended under the direction of the city forester, a man of exceptional fitness for the place. Two power and a number of smaller hand spraying outfits have been provided, also a large stock of ingredients for making arsenate of lead. A suitable force of men is engaged and spraying operations are begun as soon as the beetles begin to feed and lay in the spring. Spraying is continued until into July or as long as injury by the larvæ continues. Infested trees on private estates are sprayed by the city's employees and the expense charged to the owner. By this method the damage by the beetle is reduced to a minimum and the preservation of the elms secured. A similar method on a somewhat smaller scale is followed at Northampton with most excellent results.

Damage by the elm-leaf beetle emphasizes the desirability of planting a *variety* of trees in parks and along streets, in order to escape those insects which are confined to a few food plants. Large numbers of a single species of tree, planted thickly, give the insects attacking that species an excellent opportunity to multiply. By planting a great variety of trees, taking care that only small numbers of a single species are placed near together, a large amount of future damage by insects may be prevented. In all cases the European elm should be planted sparingly if at all.

MASSACHUSETTS
CROP REPORT

FOR THE

MONTH OF AUGUST, 1899.

ISSUED BY

J. W. STOCKWELL,
SECRETARY STATE BOARD OF AGRICULTURE.

BOSTON:
WRIGHT & POTTER PRINTING CO., STATE PRINTERS,
18 POST OFFICE SQUARE.
1899.

CROP REPORT FOR THE MONTH OF AUGUST, 1899.

OFFICE OF STATE BOARD OF AGRICULTURE,

BOSTON, MASS., Sept. 1, 1899.

Bulletin No. 4, Crop Report for the month of August, is herewith presented. Particular attention is called to the article on "Practical Hints for the Dairyman," by Prof. F. S. Cooley of the Massachusetts Agricultural College.

PROGRESS OF THE SEASON.

The August returns of the United States Department of Agriculture (Crop Circular for August, 1899) state that the average condition of corn on August 1 was 89.9, being 2.9 points higher than at the corresponding date last year, and 3.2 points above the mean of the August averages for the last ten years.

The average condition of spring wheat on August 1 was 83, being 12.9 points lower than on August 1 last year, and 0.3 point below the mean of the August averages for the last ten years. The whole of the thirteen States having 100,000 acres or upward in spring wheat show a decline in condition as compared with July 1.

The average condition of oats on August 1 was 90.8, being 6.6 points higher than on August 1 last year, and 8.3 points above the mean of the August averages for the last ten years. The proportion of the oat crop of last year still in the hands of farmers is estimated at 6.9 per cent.

The average condition of barley on August 1 was 93.6, being 14.3 points higher than on August 1 last year, and 8.6 points above the mean of the August averages for the last ten years.

The average condition of spring rye on August 1 was 89, being 4.7 points lower than on August 1 last year, and 1.5 points above the mean of the August averages for the last ten years.

Preliminary returns indicate an increase of seven-tenths of one per cent in the acreage in buckwheat, as compared with last year. There is an apparent increase of 5 per cent in New York and of 2 per cent in Pennsylvania; but in almost every other State in which any buckwheat, whatever, is grown, the tendency to a reduced acreage noted in past years continues. The average condition of buckwheat on August 1 was 93.2, being 6 points higher than at the corresponding date last year, and 2.2 points above the mean of the August averages for the last ten years.

The average condition of cotton on August 1 was 84, being 7.2 points lower than on August 1 last year, and 1.8 points below the mean of the August averages for the last ten years.

The average condition of potatoes on August 1 was 93, being 9.1 points higher than on August 1 last year, and 6.9 points above the mean of the August averages for the last ten years.

Preliminary returns indicate a reduction of 3.4 per cent in the hay acreage. Of the fourteen States mowing 1,000,000 acres, or upward, last year, only Missouri, Kansas, Nebraska, South Dakota and California show an increased acreage. The condition of timothy on August 1 was 86.7, or 12.6 points below that of the corresponding date last year.

There are few States in which the production of clover does not present a more or less marked contrast to the almost uniformly large production of last year. In the New England States there is a falling off of one-third to one-half; New York reports 71 per cent of a full crop, as compared with 109 per cent last year, etc. The quality of clover falls decidedly below last year's standard, taking the country in general.

During July the average condition of tobacco declined 11 points in Kentucky, 6 in Tennessee, 3 in Missouri, Pennsylvania and Virginia, 2 in Massachusetts, 1 in Ohio and Wisconsin, and 8 in Indiana. On the other hand, there was an improvement in New York, while in Connecticut the crop about held its own.

The condition of sugar-cane in Louisiana, 75, compares

very unfavorably with the condition one year ago, which was 104. The same is substantially true of the entire group of States reporting upon this product, in not one of which, moreover, was the condition on August 1 up to the ten-year average.

There are but few States from which the reports as to the apple crop are not even more unfavorable than they were last month. Taking the States having 3,000,000, or upward, apple trees in bearing at the last census, there was a further decline during July of 7 points in New York and Tennessee, 3 points in Pennsylvania and Kentucky, 4 in Missouri, North Carolina and Maine, and 6 in Iowa.

In Massachusetts the average condition of corn is 97 ; average condition of spring rye, 90 ; average condition of oats, 96 ; average condition of barley, 91 ; acreage of buckwheat, as compared with last year, 98, and average condition, 99 ; average condition of tobacco, 88 ; average condition of potatoes, 92 ; acreage of hay, as compared with last year, 98, and average condition of timothy, 77 ; production of clover, as compared with a full crop, 64, and average quality, 100 standing for high, 92 ; average condition of pasture, 76, and the average condition of apples, 42.

TEMPERATURE AND RAINFALL FOR THE WHOLE COUNTRY.

[FROM THE UNITED STATES CLIMATE AND CROP BULLETINS.]

Week ending July 31. — The week averaged about 3° warmer than usual throughout the Southern States, in the Atlantic coast districts, and in the Lake region, and was from 3° to 5° warmer on the north Pacific coast. The weather was cooler than usual over the greater part of California, throughout the Missouri valley, and in portions of the upper Mississippi valley. Very heavy rains fell over a large portion of the middle, south Atlantic, and east Gulf States. Heavy rains also occurred over local areas in other parts of the country. No rain fell on the Pacific coast except on the immediate coast of northern Washington.

Week ending August 7. — Week warmer than usual in nearly all districts east of the Mississippi River, and from Missouri and Kansas southward to the Gulf coast and Rio

Grande valley. Over the interior portions of California, generally throughout the Rocky Mountain regions, and over the northern portions of the Missouri and upper Mississippi valleys, the week averaged cooler than usual. The rainfall of the week was unevenly distributed. In some sections very heavy rains fell, while in other sections no rain fell, and drought conditions continue.

Week ending August 14.—The week was warmer than usual in the Southern States, in the central and lower portions of the Missouri valley, and over portions of the central Mississippi valley, Lake region and middle Atlantic States. The week was cooler than usual in New England, over the northern portion of the middle Atlantic States and upper Lake region, and generally throughout the Rocky Mountain and Pacific coast regions. There was more than the average amount of rain in the lower Missouri, central Mississippi, lower Ohio and Red River of the North valleys, also on the middle Atlantic and southern New England coasts. There was less than average rainfall over the greater part of the Lake region, in New England, and generally throughout the middle and south Atlantic and Gulf States.

Week ending August 21.—The week was warmer than usual in all districts east of the Rocky Mountains. Over the plateau and Pacific coast regions the week averaged cooler than usual. The week was marked by unusually high temperatures in northern Texas, and unseasonably low temperatures in the Lake region and northern New England. There was more than the usual rainfall over portions of the middle Atlantic and central and west Gulf States, upper Michigan peninsula, portions of the upper Mississippi and upper Missouri valleys, and on the north Pacific coast. The week was practically rainless over nearly the whole of New England, the Lake region and Ohio valley.

SPECIAL TELEGRAPHIC REPORTS.

(WEATHER BUREAU, BOSTON.)

Week ending July 31.—New England. Boston: Showers have broken drought in southern sections and conditions again favorable to crops throughout district; much hay yet

to cut in northern parts; tobacco-topping in progress; crop in good condition.

Week ending August 7. — New England. Boston: Weather favorable for haying and all farm work, but little rain, and drought again becoming serious, especially in southern sections; haying about completed; oat harvest progressing; potatoes, corn, tobacco and cranberries promising.

Week ending August 14. — New England. Boston: Rain of past week greatly improved condition of crops in southern portion; drought again becoming severe in northern portion; light frosts on 8th and 9th in northern sections, without damage; general rain needed for fall ploughing.

Week ending August 21. — New England. Boston: General drought prevailing; all crops at a standstill; corn especially suffering for rain; tobacco and cranberries promise good crops; apples very small yield, but excellent fruit; frosts occurred in many sections without damage.

THE WEATHER FOR AUGUST, 1899.

The month opened with several days of generally fair weather in all sections, and seasonable temperatures. Showers, where any occurred, were of short duration and the amount of precipitation light. The fair weather with abundant sunshine was favorable to haying and harvesting and to farm work generally. By the close of the first week the dry weather began to be seriously felt in the eastern counties of the State. Reports from numerous sections in the territory mentioned stated that farmers had never seen their meadows so dry. Streams, springs and brooks were low and stock water becoming scarce. Copious showers occurred on the 10th and 11th, resulting in great benefit to all vegetation. These were chiefly in the eastern portions of the State and by the 15th there was much complaint of the drought in the western counties. The weather was somewhat cool from the 7th to the 14th, the temperature ranging several degrees lower than for the preceding week. During the third week of the month the weather conditions were unfavorable. There was little or no precipitation,

and, except in coast sections where there was more or less cloudiness and fog, there was abundant sunshine. The temperature, especially in interior sections, was reported excessively high. The dry warm weather was favorable to farm operations, but, as a rule, the soil was too dry for cultivation. Owing to extensive cloudiness and the prevailing north to east winds, the closing week of the month was unseasonably cool in coast sections. For the interior and western parts of the State, however, seasonal thermal conditions obtained. The drought was again broken, by plentiful showers, in some sections downpours of rain, on the afternoon and night of the 22nd. The rain was principally in the eastern counties, where the dry weather was the most severe, and it was most timely and of great benefit. A notable feature of the weather of the month was the absence of the usual amount of muggy oppressive conditions, with excessive moisture and stagnant state of the atmosphere. There were fewer thunderstorms and severe or destructive local disturbances than are usual for August. While there was more or less damage from lightning, little or no damage resulted from hail and high winds. Frosts, light, occurred in favorable localities in the third week, but without damage to crops. Excepting the deficiency in rainfall, the weather of the month was all that could be desired.

In the circular to correspondents returnable August 23, the following questions were asked: —

1. What is the condition of Indian corn?
2. What is the prospect for rowen as compared with a normal crop?
3. What is the prospect for late potatoes and have you noticed blight or rot?
4. How do the acreage and condition of tobacco compare with former years?
5. What is the prospect for apples, pears, peaches, grapes and cranberries?
6. What is the condition of pasturage in your vicinity?
7. How have oats and barley compared with former years?

8. Do your farmers pay much attention to poultry, and what proportion does the income derived from poultry products bear to that derived from dairy products?

Returns were received from 178 correspondents, from which the following summary has been made : —

INDIAN CORN.

Indian corn is somewhat backward as a rule, but is otherwise generally in fine condition and promises a good yield of both stover and ears. There are some complaints of leaf curl, but these are not general, and the recent rains have probably done much to alleviate this condition. Rain was needed for the continued well being of the crop in many sections, at the time of making returns, but since then heavy rains have fallen in almost all parts of the State.

ROWEN.

The rowen crop will be light in all sections, and in the eastern part of the State it is nearly a failure. Early cut fields will yield well in some instances, but as a general rule mowing fields have not yet recovered from the drought of the early part of the season, and much rain is still needed to put them in condition for next year.

LATE POTATOES.

At the time of making returns, late potatoes were looking well and promised to give a good crop. Much depends on the set, however, and it would not be surprising, if on digging they were found to be, like early potatoes, few in the hill. Blight has appeared, more or less, in all sections, but is by no means general, while but very little rot is reported. In parts of the southeastern counties white grubs are reported to be doing much damage to the tubers.

TOBACCO.

Tobacco is reported as somewhat uneven, owing to the early drought, which necessitated much resetting. Otherwise the crop is generally in excellent condition and promises a good yield. There appears to be less worm and flea work than usual, and but little injury from wind and hail. Cut-

ting was well under way in most sections at time of making returns, and is now practically completed.

FRUITS.

Among fruits, grapes stand out in welcome contrast, by reason of the good crop generally promised. Cranberries also promise, at worst, a normal crop. Other fruits are very poor taken as a whole. Apples have dropped badly and even a smaller crop will be harvested than was anticipated. Pears are not more than half a crop, and peaches are, practically speaking, a total failure.

PASTURAGE.

Pasturage has fallen off since the last report, and at time of making returns was quite short in all except extreme western sections. Springs and brooks were also reported to be failing in many sections. The recent rains have probably done much to alleviate this condition, and to improve that of pasturage.

OATS AND BARLEY.

These crops are considerably below the normal, both as to grain and straw, owing to the dry weather. As late planted forage crops they have done fairly well.

POULTRY KEEPING.

As in previous years poultry keeping is reported as generally on the increase, and in many sections much attention is now paid to this branch of husbandry. This is, as always, particularly true of the southeastern counties, where the income from this source appears to fully equal that from the dairy. The replies returned as to relative income were not numerous enough to warrant any definite statement as to other sections, but where an opinion as to the relative profit of the two was given it was almost invariably in favor of the poultry. That so many of our farmers find it profitable to keep poultry, practically without care, leads us irresistably to the conclusion that with due attention poultry keeping may be made one of the most profitable departments of the farm.

NOTES OF CORRESPONDENTS.

(Returned to us August 23.)

BERKSHIRE COUNTY.

Sheffield (DWIGHT ANDREWS). — Indian corn is looking well. Rowen promises to be a full average crop. The prospect for late potatoes is very good, but blight has appeared. Tobacco is not up to the average in condition. There will be less than an average crop of all kinds of fruit. Pastures are looking well. Oats and barley are full average crops. Poultry raising is getting to be quite an industry here, and the income derived from it is fully equal to that from the dairy.

Otis (S. H. NORTON). — Indian corn is looking well. Rowen will be about an average crop. Potatoes are making a fair yield with no blight. Apples and pears will be very light crops. Pastures are in fair condition. Oats are a full average crop. While every farmer keeps a few hens few make a business of poultry raising.

Lee (A. BRADLEY). — Indian corn is very nearly up to the normal. Rowen will not be over one-fifth of an average crop. The prospect for late potatoes is first-class, and no blight or rot has as yet appeared. Apples are 60 per cent of a full crop and grapes 100 per cent. Pasturage is a little off in condition. Oats and barley were very nearly full crops. The attention of farmers is being more and more called to poultry. There is always a great demand for poultry products, and this demand is constantly increasing, which necessitates the importation of large quantities each year.

Stockbridge (F. A. PALMER). — Indian corn is doing nicely but is rather late. The prospect for rowen is good, but it is not up to an average crop. The prospect for late potatoes is very fine, with no blight as yet. There is about a half crop of apples and pears; grapes good; no peaches. Pastures are only fair as the season is rather dry. Oats are less than an average crop, but are the best crop for three years. Our farmers are doing more each year in poultry, but as yet very little as compared with the dairy interests.

West Stockbridge (WM. C. SPAULDING). — Indian corn is in good condition. The prospect for rowen is good. The prospect for late potatoes is good, and there is no blight or rot as yet. There is hardly half a crop of any kind of fruit, and no cranberries. Pastures are in fair condition but need rain now. Oats and barley were rather light crops, especially as to straw. There is nothing done in poultry as a regular industry.

Washington (E. H. EAMES). — Indian corn is in good condition. The prospect for rowen is good, being about the same as last year. Late potatoes promise a good crop, with no blight or rot as yet. Apples are a fair crop; pears light. Pasturage is in very good condition. Oats are a heavy crop. Our farmers pay but little attention to poultry.

Hancock (C. H. WELLS). — Indian corn is in fine condition. The season has been dry and the rowen crop will be very light. Late potatoes are a fair crop, and there is not much blight or rot to report. The crop of apples and pears is rather light. Pasturage is very short at present. Oats are better than for many years; not much barley raised. Two or three farmers keep from 100 to 150 hens, which pay a net profit of \$1 each.

Savoy (W. W. BURNETT). — Corn is a little backward, but shows a fair growth where it came up well. Rowen is hardly up to the average, owing to the early drought. The prospect for late potatoes is good, with no blight or rot noticed. This is an off year for apples, and other fruits are but little grown. Pasturage is in fair condition, the late rains having caused much improvement. Oats and barley are full average crops. All keep some poultry, but the income derived from it is not more than one-fourth that from the dairy. Field turnips are looking finely.

Williamstown (S. A. HICKOX). — Indian corn is in very good condition. Rowen promises to be about a three-fourths crop. Blight has appeared on potatoes in some fields. Apples show a good yield in some orchards; pears short. Oats made a good yield, though the straw is small. Very little is done with poultry in this section.

FRANKLIN COUNTY.

Rowe (J. F. BROWN). — Indian corn is backward but has made a good growth. Rowen is late but promises to be an average crop. Potatoes are looking finely, with no blight or rot. The prospect is very poor for all kinds of fruit. Pasturage is about in average condition for the time of year. Oats and barley are more than average crops. Our farmers do not give poultry very much attention.

Charlemont (S. W. HAWKES). — There is a very heavy growth of corn stover, and it is earing well, though late. There will be a fair crop of rowen. Potatoes are yielding well, with very little blight or rot. There is only one field of tobacco in town. There will be a light crop of all kinds of fruit. Pastures are in very good condition, though a little dry now. Oats and barley are not raised except for green feed. Farmers are raising more poultry than in years past, and are receiving a good income from it.

Ashfield (CHAS. HOWES). — Corn will be a good crop except on very dry land. Rowen will probably not be over half a crop, and mostly clover. Late potatoes show some blight but no rot as yet; yield medium. Tobacco is not much raised, and is more uneven than usual. Apples are a light crop, though yielding better than was anticipated; other fruits nearly total failures. Pasturage is getting very dry and short, and the water supply is also failing in some pastures. Oats and barley have been very good, but were almost wholly cut for forage. Poultry raising is on the increase, and where attended to gives better returns than dairying.

Deerfield (CHAS. JONES). — Indian corn is early and an extra crop. Rowen is looking fairly, but will be a light crop. Potatoes are of good quality and size, but few in the hill; no blight or rot as yet. The tobacco crop is being harvested, and if it cures well will be a fine crop. Apples few; no pears or peaches; few grapes and cranberries. Pastures are in fair condition. Oats are above an average crop. There is not much done with poultry here.

Gill (F. F. STOUGHTON). — Corn is a very good crop, but is late. Rowen will be an average crop, or nearly so. The prospect is that all kinds of fruit will give very light crops. Pasturage is not in very good condition, as the season has been too dry. Oats and barley are average crops. There is considerable poultry kept by our farmers.

Northfield (T. R. CALLENDER). — Corn is somewhat uneven, but is generally up to the average. On early cut pieces a moderate crop of rowen will be secured. Late potatoes promise a good yield; but little blight or rot. The acreage of tobacco is about as for the last two years; crop fine, the best since 1892. Apples are not more than 30 per cent of an average crop. Pasturage recovered well from the early drought, but is beginning to show need of rain. Oats are a good crop where planted early; late sown came poorly; barley for fodder looks well. Very little attention is paid to poultry, and the income from it is probably less than a tenth part of that from the dairy. Cucumbers for pickling are a fair crop, though unseasonably cool weather has caused rust on the vines.

Sunderland (J. M. J. LEGATE). — Corn is a little late, but there is a heavy growth of fodder and the promise of a very heavy growth of corn. Rowen will be much below an average crop. Very few late potatoes are raised and there is no blight or rot. There is an increase in the acreage of tobacco, but the crop is below the average owing to the drought the fore part of the season. All kinds of fruit will give very poor crops. Pasturage is now short. But little attention is paid to poultry. Every one keeps a few hens, but very few keep any account with them so as to be able to give the income derived. Onions show an increase in acreage and promise to be a very heavy crop.

New Salem (Daniel Ballard). — As a rule Indian corn is looking well. Owing to the late dry weather, the rowen crop will be below the normal. Late potatoes promise well and I have seen but little blight or rot. Apples are a light crop; but few pears or peaches; grapes plenty and some cranberries. Pasturage is rather short and poor. Oats have been a fine crop and are raised mostly for fodder. Nearly all farmers pay some attention to poultry and several make a specialty of it. When well cared for the profits are greater than from the dairy.

Orange (ANSEL HARRINGTON). — There is a good growth of corn stover and a prospect of a fair crop. Rowen will not be more than two-thirds of an average crop. Late potatoes give a fair yield, of excellent quality, though there is a very little blight. There is a very light crop of apples, pears and grapes, and no peaches. Pasturage is rather short on account of dry weather. Oats and barley are about average crops. Considerable attention is paid to poultry raising, but the income from it is quite small compared to that from the dairy.

HAMPSHIRE COUNTY.

Enfield (D. O. CHICKERING). — Indian corn is backward and below the average. Rowen promises about an average crop. The prospect for late potatoes is good, with but little blight or rot. Apples are a light crop; cranberries good. Pasturage is in good condition. Oats and barley are average crops. The income derived from poultry products is only a small proportion of that from the dairy.

Pelham (J. L. BREWER). — Indian corn promises well. Rowen will be a little below an average crop. Late potatoes show a tendency to blight, but no rot as yet. Apples and pears are a light crop; no peaches; grapes and cranberries promise well. Pastures are rather short. Oats and barley are about average crops. All

our farmers keep some fowls, and I should judge the income from them to be about one-third that from the dairy.

Hadley (H. C. RUSSELL). — Indian corn never looked better. Rowen has not done as well as was expected, not having recovered from the effects of the early drought. Late potatoes are looking fairly well, though there are some indications of blight. There is a slight increase in the acreage of tobacco and the condition is excellent. There are but few apples and pears; no peaches. Pastures do not look extra good. There is not very much done with poultry.

Granby (GEO. A. BLISH). — There is a good growth of corn fodder, but some time is needed to mature the ears. There will be very little rowen in this section. There is some complaint of blight on late potatoes, but they are so far along that we hope for an average crop. We have scarcely any fruit of any kind. At the present time pastures need rain very much. Oats were a short crop; no barley raised. We do not pay much attention to poultry.

Southampton (C. B. LYMAN). — Indian corn is a full average crop. Rowen will be about one-third of a full crop. The prospect for late potatoes is very good, though there is some blight. There is a full average acreage of tobacco, and its condition is rather better than average. Apples 30 per cent of a full crop; pears very few; no peaches; grapes 75 per cent. Pastures are brown and feed very scarce. Oats are a light crop. But few make a business of poultry raising. All farmers have a few fowls, more for convenience than revenue.

Northampton (D. A. HORTON). — Indian corn is in very good condition. Rowen will be a good crop on the meadows. Tobacco is fully up to the average in acreage and condition. There will be but little fruit of any kind. Pasturage is in fair condition, though hardly recovered from the early drought. Poultry and its products always command a better price and a readier market than any other product of the farm.

Goshen (ALVAN BARRUS). — It is too dry for Indian corn, and some fields are rolling badly. Rowen is also suffering because of drought. Late potatoes will give a light yield; there is a little blight but no rot. Apples are one-fourth of a crop; pears much below average; no peaches; grapes normal; cranberries uncertain. Feed is fast drying up, though stock has done well thus far. Oats are up to a high standard; barley all cut for feed. Poultry raising is increasing in popularity, and opinions vary as to returns.

Worthington (C. K. BREWSTER). — Indian corn is in good condition. Rowen will be a light crop. Potatoes are good in quality

but rather light in yield. Pastures are dry and feed rather short. Oats and barley are about average crops. Apples are going to yield much better than was expected in this vicinity; other fruits short in yield. We need rain, for the pastures especially.

Middlefield (J. T. BRYAN). — Corn is in excellent condition. Rowen will be an average crop, but not up to the excessive crop of last year. Potatoes will be a full average crop and free from rot and blight. Fruits of all kinds will be a light crop. Pastures are rather short from the effects of dry weather, but stock has kept in good condition. Oats and barley are large crops. Not much attention is paid to poultry raising.

HAMPDEN COUNTY.

Chester (P. M. ADZIMA). — Indian corn is in very good condition. Rowen promises about an average crop. Potatoes promise to give a large crop. The prospect is very fine for all kinds of fruit. Pastures are in very good condition, considering the dry weather. Oats and barley are about average crops. All farmers keep some poultry, but they pay more attention to the dairy.

Russell (E. D. PARKS). — Indian corn is very good indeed. Dry weather has affected the rowen crop, and there will not be over half a crop unless rain comes at once. Late potatoes promise well, and only one or two instances of blight are reported. There is a very small crop of apples; pears quite plenty; other fruits small crops. Pastures were good up to August 1st, but are drying up quite fast. Oats and barley are about average crops. Farmers here think poultry pays very well, and most of them make quite an item of this part of their business.

West Springfield (J. N. BAGG). — Indian corn is very promising. Rowen is about an average crop. Late potatoes are above the average; no blight and very little rot. Tobacco is above the average in condition, and there is very little damage from worms. The prospect for fruit is fair, except for peaches. Pasturage is in poor condition. Some of our farmers pay considerable attention to poultry. The year promises to be a good average one, better than was thought possible in the time of drought.

Chicopee (R. W. BEMIS). — Corn is in good condition. Rowen promises to be nearly an average crop. The prospect for late potatoes is good, and no blight or rot has appeared. Tobacco promises to be a good average crop. Apples are a fair crop; pears not a large crop; no peaches; grapes fair. Pasturage is in fair condition. Oats and barley are good crops. Most farmers keep enough hens for family use, and some make a specialty of poultry.

Ludlow (C. B. BENNETT). — Corn fodder looks well, but the ears are not filling out very well. Rowen will not be half a crop. Late potatoes are just commencing to blight. There are very few apples and pears, and no grapes, peaches or cranberries. Pastures are very dry. Considerable attention is paid to poultry, and the income derived from it is about one-fourth that from the dairy.

Wilbraham (H. M. BLISS). — Indian corn is very nearly a full crop. Rowen is about two-thirds of an average crop. Late potatoes promise a three-fourths crop; some blight but little rot. All kinds of fruits promise about half crops. Pasturage is in fair condition. Oats and barley are nearly up to full normal crops. Considerable attention is paid to poultry, and it is fully as profitable as the dairy.

East Longmeadow (J. L. DAVIS). — Indian corn promises a good crop if the drought is broken soon. Rowen will be an average crop. Late potatoes promise a fair yield, though there is a great deal of blight. Apples, pears and peaches are light crops; grapes plenty. Pasturage is very dry and short. Oats are three-fourths of a full crop. Few farmers keep over fifty hens, relying on the dairy for their principal revenue.

Monson (W. M. TUCKER). — Corn is about an average crop, having improved much the last few weeks. Rowen will be a very fair crop where the first crop was cut early, but is on the whole below the average. Late potatoes are a good crop, though most fields are struck with blight; very little rot as yet. Light crop of apples; few pears; no peaches; grapes and cranberries plenty. Feed is short in pastures and the milk supply suffers, but young cattle look well. Oats and barley were not up to the average as to grain, and the straw was very light. A few do quite a business with poultry, and report quite satisfactory returns; should think the proportion of income would be as low as one for poultry products to six for the dairy.

Holland (FRANCIS WIGHT). — Indian corn is doing well although the ground is getting very dry. The dry weather is pinching the rowen crop. The prospect is good for late potatoes, and neither blight nor rot have appeared. The prospect is very poor for all kinds of fruit except cranberries. Feed in pastures is getting dry and poor. Oats and barley are about average crops. Farmers have struck into the poultry business more this year than common, and the income derived from it is about two-fifths that from the dairy.

WORCESTER COUNTY.

Dudley (J. J. GILLES). — Indian corn is about an average crop. The prospect for rowen is not very good. There will be a full crop of late potatoes, with no blight or rot. Grapes and cranberries promise well. Pasturage is in poor condition. Oats and barley are light crops, both in straw and grain. A large majority of our farmers keep from 50 to 100 hens.

Oxford (D. M. HOWE). — Indian corn is looking well. Rowen will be far below an average crop, owing to dry weather. The prospect for late potatoes is good, and neither blight nor rot has appeared. Apples very few; pears good; no peaches; grapes plenty; cranberries a fair crop. Pasturage is very short. Oats and barley are average crops. It is very dry here at present.

West Brookfield (L. H. CHAMBERLAIN). — Corn is looking finely. Rowen promises to be about a three-fourths crop. The prospect is good for a large crop of late potatoes, no blight or rot as yet. Few apples; pears plenty; no peaches or cranberries. Pasturage is in good condition. Oats are all cut for fodder. But little attention is paid to poultry by our farmers.

North Brookfield (J. H. LANE). — Indian corn promises to be about an average crop. Rowen will be a short crop, as the weather has been too dry at times. Apples 10 per cent of a full crop; no pears or peaches; grapes good; cranberries 25 per cent. Pasturage is in good condition, as there have been showers enough to keep it along. Oats and barley have been a little over three-fourths crops. The income derived from poultry products is about 5 per cent of that from the dairy.

Spencer (H. H. KINGSBURY). — The condition of corn now indicates that it will yield a large crop of stover and an average amount of grain. The prospect for rowen is less favorable than a month ago, as the hot dry weather has checked its growth somewhat. No rot on late potatoes as yet, but the vines are all dead. Grapes and cranberries plenty; scant supply of apples; few pears. Pasturage is getting short and in need of rain. Nearly all the oats and barley raised are cut for hay. Only those who make it a business keep poultry to any extent.

Oakham (JESSE ALLEN). — Indian corn is in fair condition. There will be almost no rowen. The prospect is good for late potatoes, and as yet we have neither blight nor rot. Apples, pears and peaches are very scarce; grapes abundant; no cranberries. Pastures are in good condition. Oats and barley are fair crops. Much attention is paid to poultry, and the income derived from it is perhaps one-sixth that from the dairy.

Dana (E. A. ALBEE). — Corn is in good condition. There will be a very small amount of rowen on account of the lateness of the first crop and of drought. The prospect for late potatoes is fair, no rot as yet, but some blight. There will be practically no fruit in this locality. Pasturage is short owing to dry weather. Oats and barley are average crops. Most farmers keep poultry, and the income derived from it is about one-fourth that derived from the dairy.

Royalston (C. A. STIMSON). — A heavy crop of corn is in prospect. Rowen promises to be about 80 per cent of a full crop. The prospect is good for a large crop of late potatoes, though blight has attacked some fields. The prospect is poor for all kinds of fruit. Pasturage is somewhat off in condition. Oats and barley are normal crops. Not much attention is paid to poultry, but the product is probably worth one-fourth that of the dairy.

Gardner (A. F. JOHNSON). — Indian corn promises an average crop. Rowen will be half an average crop. Late potatoes look well, though there is a small amount of blight. Apples will be 20 per cent of a full crop. Pastures are dry and short. Oats and barley are about three-fourths crops. Our farmers do not pay much attention to poultry, and the income derived from it is not over 10 per cent that derived from the dairy.

Westminster (I. DICKINSON). — Indian corn is good, but rather late. The prospect for rowen is poor, as the weather has been too dry. The prospect for late potatoes is good, with no blight or rot. Grapes are plenty, other fruits very light. Pasturage is in very poor condition. Oats and barley are full average crops, but not allowed to mature as a rule. Much attention is paid to poultry as a business.

Bolton (H. E. BABCOCK). — Corn is uneven and late on account of drought. Rowen will not be over two-thirds of a normal crop. Late potatoes are quite good in this locality, no blight or rot as yet. No apples or peaches, few pears; grapes and cranberries quite plenty. Pasturage is very dry and short. Very little oats and barley are raised to ripen in this section. Considerable attention is paid to poultry, but the income from it is small compared to that from dairy products.

Northborough (J. K. MILLS). — Corn is looking well. Rowen will be a light crop. Late potatoes will not give a very large crop; blight has made its appearance. There will be a very light crop of apples; a three-fourths crop of pears; few peaches and a three-fourths crop of grapes. Pasturage is very short on account of dry weather. Oats and barley have both been good crops. Every farmer keeps hens, some more and some less, and I should

judge about 10 per cent of their income was derived from their poultry.

Worcester (H. R. KINNEY). — Indian corn is looking well, but is rather late. Rowen will be light except where the grass was cut early. Late potatoes promise a fair crop, though there is some blight. Apples poor; pears fair; peaches light; grapes good. Pasturage is getting dry and being damaged by grasshoppers. Oats and barley were heavier than usual, but were all cut green. Poultry is not kept extensively here, but there are some fowls kept on many of the smaller places. I should think the income derived from poultry might be at the rate of 1 to 5 with that from the dairy, and I think the scale of profit would be more in favor of the poultry.

Hopedale (DELANO PATRICK). — Corn has suffered some from drought, but is looking fairly well where it came up well. Rowen will not be half a crop. Late potatoes will be a light crop, though neither blight nor rot have appeared. There will be very few apples and peaches and not many pears. Pasturage is in very poor condition, and has been all summer. Oats and barley are light crops and not much raised. Not much attention is given to poultry compared to the dairy. The extremely dry season has been unfavorable to all branches of farming.

Uxbridge (AUGUSTUS STORY). — Indian corn is a fair crop, and will not yield up to last year. Rowen promises to be a poor crop, as the fields are brown and bare. The crop of late potatoes will be small, and white grubs are doing much damage. Apples fair; pears light; no peaches; grapes a heavy crop. Pastures are in poor condition, and brooks, springs and wells are very low. Oats and barley are not up to the normal. Much attention is paid to poultry, and the income derived from the two is about equal. Ensilage corn is not up to field corn, or to last year's crop for the silo. White grubs are also doing a great deal of damage to grass roots.

MIDDLESEX COUNTY.

Sherborn (N. B. DOUGLAS). — Indian corn looks fully as well as usual. Very little rowen will be cut. Blight is quite general on late potatoes. Very few apples, pears or peaches; grapes and cranberries fair crops. Pastures are very short and dry. Oats and barley are about average crops. Considerable poultry is kept, and the income from this source is about one to ten when compared to that from the dairy. Springs and wells are very low.

Ashland (C. E. ADAMS). — Indian corn will mature early, but will be an average crop. No rowen will be cut. There are no late potatoes in this vicinity, and no rot on early potatoes. Very

few pears, grapes and cranberries ; no apples or peaches. Pastures are very, very dry. Oats and barley are not quite average crops. Our farmers pay a good deal of attention to poultry, and I should say the profit from it was double that from the dairy for capital invested.

Framingham (H. S. WHITEMORE). — Indian corn is fairly good considering the dry weather. Rowen will be a very poor crop. Late potatoes will not be over three-fourths of a full crop. Apples very poor ; no peaches ; grapes a small crop. Pasturage was never so poor, and stock is mostly fed at the barn. Oats and barley are short crops, with light yields of grain. No particular attention is paid to poultry, but it is thought to be more profitable than the dairy.

Boxborough (J. F. HAYWARD). — Indian corn is in good condition. Rowen is a very light crop. Late potatoes will be a smaller crop than usual ; no blight or rot as yet. There will not be a large crop of any kind of fruit, and practically no peaches. Feed is short in the pastures. Oats and barley are normal crops. Most of our farmers keep poultry.

Ashby (A. WETHERBEE). — Indian corn is a little late, but is otherwise looking as well as usual. Hardly any rowen will be cut, except on low lands. Late potatoes will be a good crop ; some blight but no rot as yet. There are a few apples and pears ; grapes 80 per cent of a full crop ; no peaches. Pasturage is short and quite dry. Oats and barley are not up to normal crops. The income derived from poultry is about one-fifth of that derived from the dairy.

Dunstable (A. J. GILSON). — Corn is doing very well considering the severe dry weather. Rowen is far below a normal crop. Very few late potatoes have been harvested ; blight has appeared, but no rot. Apples, pears and peaches are a failure ; grapes and cranberries a light crop. Pastures are very dry and short of feed. Oats and barley are about normal crops. Very little attention is paid to poultry by our farmers.

Billerica (J. N. PARDEE). — Corn is filling out well, but is curling badly. On most mowing lands there is no crop of rowen at all. The prospect is for a very light crop of late potatoes ; have seen neither blight nor rot. Apples scarce ; pears ordinary ; no peaches. Pastures are badly dried up and springs generally dry. Comparatively little attention is paid to poultry by the general farmer, and the income from it is small. Everything is suffering from long protracted drought.

Carlisle (E. J. CARR). — Indian corn is in good condition. Rowen is far below a normal crop. Late potatoes are a fair crop,

with no blight and but little rot. Apples are very scarce ; pears few ; no peaches ; grapes and cranberries plenty. Pastures are in poor condition. Oats and barley are less than average crops. Only a few farmers pay much attention to poultry, though there is four times the profit from it in proportion to the money invested that there is from the dairy.

Bedford (HENRY WOOD). — The dry weather has affected corn, but there will be a fair crop. Rowen will probably be about half a crop. I have noticed some blight on late potatoes, but they are generally good. Few apples ; no peaches ; few pears ; grapes good ; cranberries fair. Pastures were never so dry at this season of the year. Oats and barley are very good crops, but are mostly cut green for fodder. The income derived from poultry is about one-fourth that derived from the dairy.

Concord (WM. H. HUNT). — Indian corn is looking well. There will be a small crop of rowen. Late potatoes are looking well ; have noticed no rot. Apples very light ; pears moderate ; no peaches ; grapes fair. Pastures are very dry. Oats and barley are rather below the average. Very little attention is given to poultry.

Woburn (W. H. BARTLETT). — Sweet corn is the only kind grown and is in good condition. There will be very, very little rowen on account of drought. Apples will be very scarce as a rule ; few pears ; no peaches ; few grapes. Pasturage is all dried up. Oats are used for fodder and made a short growth. Not as much attention is paid to poultry as there should be, as it pays better for money invested than other kinds of stock. Tomatoes do not ripen, and show considerable black rot. Cabbages are suffering from drought and are lighter than usual. Early potatoes blighted about the first of August, but later ones are looking very well. Squash bugs have done great injury to the crop and with dry weather have shortened it more than half. Winter beets are small and need rain, as do also carrots.

Stoneham (J. E. WILEY). — Indian corn is little raised, mostly for the silo. Rowen will be a very light crop. The prospect for late potatoes is good. Apples poor ; pears fair ; grapes and cranberries good. Pasturage is in very poor condition. Our farmers do not pay much attention to poultry, except for home use.

ESSEX COUNTY.

Haverhill (EBEN WEBSTER). — Indian corn is in good condition. Rowen promises to be about half a crop. The prospect is fair for late potatoes, and there is little blight or rot. Apples one-third

of a crop; pears one-half; no peaches; grapes abundant. Pastures are rather dry. Not much attention is paid to poultry, though most of our farmers keep small flocks.

Newbury (GEO. W. ADAMS). — Indian corn is in from fair to good condition. Rowen will be perhaps 30 per cent of a normal crop. Late potatoes promise fairly well, with very little blight or rot. Apples are 10 per cent of a full crop; pears 75 per cent; peaches, 50 per cent; grapes, 100 per cent; cranberries, 75 per cent. Pasturage is badly dried up. Oats and barley are fair crops, though the straw is a little short on account of drought. Not much attention is paid to poultry, as a rule, and the income derived from it is perhaps 10 per cent of that from the dairy.

Andover (M. H. GOULD). — Corn is below the average on account of dry weather. Rowen is about half a normal crop. Late potatoes promise half a crop; blight did not appear until they were well matured; no rot. No apples, pears, peaches or grapes; cranberries doing well. Pasturage is very dry. Oats and barley are not up to the standard. Very little attention is paid to poultry.

Wenham (N. P. PERKINS). — There is not much corn raised, but what there is is looking well considering the dry weather. But very little rowen will be cut. Late potatoes are a fair crop, with some exceptions; no rot. Not many apples, but more than was expected; few pears and cranberries. Pastures are very short now and cows are fed at the barns. Oats and barley are fair crops. Many farmers keep poultry enough for home use. The income derived from poultry is about one-fifth that from the dairy.

Manchester (JOHN BAKER). — Indian corn has done finely this year. There will be very little if any rowen, owing to drought. The prospect for late potatoes is rather poor, though there is no blight or rot. Apples will be a fair crop; very few pears, peaches or grapes. Pastures are very dry and poor. Oats and barley are mainly raised for fodder. Every farmer keeps a few fowls, but there are no extensive henneries. I should say that the profit from 50 hens would equal that from one good cow.

Danvers (C. H. PRESTON). — Indian corn is in fair condition. Very little rowen will be cut. Late potatoes promise a light crop, though there is no blight or rot. Few winter apples; small crop of pears; no peaches; grapes good. Pasturage is in very poor condition. Our farmers pay much attention to poultry, but I cannot say what proportion the income from it bears to that from the dairy.

NORFOLK COUNTY.

Bellingham (J. J. O'SULLIVAN).—Indian corn is in fair condition. Rowen is a good average crop. The prospect is poor for late potatoes, and blight has appeared. Apples poor; pears poor; grapes good; cranberries fair. Pasturage is in poor condition. Oats and barley are fair crops. Considerable attention is paid to poultry, and the income derived from it is probably 20 per cent of that from the dairy.

Medway (MONROE MORSE).—Indian corn looks well. There will be but very little rowen. The prospect for late potatoes is very good. Apples are one-fifth of a full crop; pears a full crop; peaches 15 per cent; grapes a full crop. Pasturage is badly dried up.

Millis (E. F. RICHARDSON).—Indian corn is in fair condition, but needs rain. The prospect for rowen is very poor. There will be an average crop of late potatoes, with no blight or rot. There will be hardly any fruit of any kind. Pastures are dry and barren. Oats and barley are much below the crops of former years. Some farmers pay much attention to poultry, and those who do have good results, and receive more profit from the poultry than from the dairy.

Foxborough (E. A. MORSE).—Indian corn is fully up to an average crop. Rowen is not over one-fourth of a normal crop. Late potatoes promise well, with no blight or rot at present. Apples fair, and cranberries a full crop. Pastures are very dry and poor. Oats and barley are little raised.

Randolph (R. A. THAYER).—Indian corn promises a good average crop. Rowen will be about two-thirds of a normal crop. Late potatoes promise a good crop, with no rot. Apples very scarce; pears good; grapes and cranberries promising. Pasturage is badly dried up. Oats and barley were about half crops, and were used for fodder. Our farmers raise poultry mainly for home use.

Avon (S. F. OLIVER).—Indian corn is in good condition. Rowen will generally be a light yield. Late potatoes look very well; no sign yet of blight or rot. Apples and pears will give about the usual crops. Pastures are dry and poor except on low lands. Farmers here pay more attention to fancy poultry than to market fowl, and the income is as great if not greater than that from the dairy.

Cohasset (E. E. ELLMS).—Indian corn is in very good condition. There will be no rowen cut. Late potatoes promise a

good crop; some blight but no rot. The prospect for fruit of all kinds is very good. Pasturage is in very poor condition and needs rain badly. Oats and barley compare well with the crops of former years. Our farmers do not pay much attention to poultry.

BRISTOL COUNTY.

Mansfield (WM. C. WINTER). — Corn has looked finely but now needs rain, as the leaves are beginning to curl. Rowen will be much below a normal crop, and high ground will yield very little. Late potatoes are looking well, but need rain; no blight or rot. Apples have dropped badly and are a very light crop; peaches, which were fair in some places, are ripening poorly; grapes full; cranberries reported fair. Pasturage is getting very poor, especially on high ground. Oats and barley both headed out well, but are very light in straw. The income derived from poultry is about equal to that from the dairy.

Attleborough (ISAAC ALGER). — Indian corn is a full average crop. There will be no rowen, owing to the damage to grass roots from the early drought. Late potatoes are in good condition, with no blight or rot. No apples; grapes good; cranberries fair. Oats and barley are much below average crops. Pasturage is very short.

Raynham (N. W. SHAW). — Indian corn is in good condition. The prospect for rowen is very good. The prospect for late potatoes is good, with no blight or rot as yet. Apples are a half crop; pears three-fourths; peaches one-eighth; and grapes three-fourths. Dry weather and white grubs have injured pastures. Oats and barley are average crops. The income derived from poultry and that from the dairy are about equal. White grubs are injuring grass lands to a very serious extent.

Dighton (J. N. PAUL). — Indian corn is in good condition. Rowen is about half a crop and needs rain badly. Late potatoes promise a good crop, with no blight or rot. Apples good; pears fair; peaches and grapes good. Pastures are in poor condition and need rain. Much attention is paid to poultry, and the income from it is nearly as great as that from the dairy. Strawberry beds are looking well, but need rain. Onions have done very well, and are a full average crop.

Westport (A. S. SHERMAN). — Indian corn was never in better condition. The rowen crop is very light. Late potatoes promised a good crop, but some rot has appeared. Apples and peaches are medium crops; pears and grapes abundant; cranberries scarce. The season has been too dry for pastures, and feed is short. Oats

are a good average crop. Poultry is raised quite extensively, and the income from it is nearly equal to that from the dairy.

Acushnet (M. S. DOUGLAS). — Indian corn is in good condition. There is very little rowen, except on new meadows on low land. There will be a good crop of late potatoes, with no blight or rot. Apples, pears, grapes and cranberries are making a good showing. Pasturage is not in good condition owing to dry weather. Oats and barley have been from one-half to two-thirds crops. Farmers are becoming more interested in poultry each year, and the income derived from it is greater than that from the dairy.

PLYMOUTH COUNTY.

Hingham (AARON LOW). — Indian corn is looking well, but the dry weather is injuring it. The prospect for rowen is very poor. Late potatoes are looking well, with but little blight. There will be a small crop of all kinds of fruit. Grass has dried up badly in pastures. Our farmers are paying more attention to poultry during the last few years than formerly, as the demand for eggs and poultry has continually increased.

Brockton (DAVIS COPELAND). — Corn is looking well and promises to be a good crop. Rowen is a good crop where insects have not injured it. The prospect is good for late potatoes, with no blight or rot. Very few apples, pears or peaches; grapes and cranberries not much raised. Pasturage has improved, but is still very short. Oats and barley are raised only for fodder, and have done fairly well. Our farmers do not pay much attention to poultry.

Marshfield (J. H. BOURNE). — Late planted corn has wonderfully improved, and the dry weather has not hurt the crop, though rain is now needed. Rowen is not an average crop but is better than was expected. Late potatoes promise fairly well; some blight, but not much rot as yet. Apples are a better crop than last year; pears average; few peaches; grapes better than average. Pasturage has improved, but rain is needed. Dry weather has injured oats and barley. Much attention is paid to poultry and more money is received from it than from the dairy. Cranberries are not equal to last year in this town, but a full average crop is reported for the county.

Duxbury (A. M. GOULDING). — Indian corn is better than common at this season. Rowen will be a light crop. There is no blight or rot as yet on late potatoes, and an average crop is promised. Apples fair; peaches and pears light; grapes and cranberries good. Pasturage is very short. Oats and barley compare

favorably with former years. Farmers in this vicinity pay but little attention to poultry.

Plympton (JACOB PARKER). — Corn is looking well. Rowen will not give a normal crop. No blight or rot has appeared as yet on late potatoes. The cranberry crop promises to be a great one. Pasturage needs rain. Much attention is paid to poultry raising and very little to the dairy.

Bridgewater (R. CASS). — Indian corn is in good condition. Rowen will be below the normal in yield. The prospect for late potatoes is good; some blight, but no rot. Apples are below the average; pears good; no peaches. Pasturage is in poor condition. Oats and barley are less than average crops. We have a few who make a specialty of poultry, but generally speaking little attention has been paid to it.

BARNSTABLE COUNTY.

Bourne (D. D. NYE). — Indian corn is a fair crop. The prospect for rowen is favorable. Very few, if any, late potatoes are grown. Apples a fair crop; cranberries looking finely; few pears; no peaches. Pasturage is in very good condition, but is close fed. Oats and barley are good average crops. Very little poultry is raised except by a few, and there are practically no dairy products.

Falmouth (D. R. WICKS). — Indian corn is about a normal crop as a whole. The rowen crop will be very light, as drought cut it short. Potatoes are a small crop, of fine quality; no rot. There will be fine crops of apples, pears, peaches and cranberries. Pasturage is in poor condition owing to drought. Oats and barley are about average crops. The incomes from poultry and the dairy are about equal, as there is very little dairying done here.

Barnstable (JOHN BURSLEY). — Indian corn is an average crop. Rowen promises to be 75 per cent of a full crop. Late potatoes are a good crop; no blight or rot noted to date. Apples and grapes good; pears and peaches light; cranberries fair. Pasturage is in good condition except where the white grub is at work. Oats and barley are about average crops. The income from poultry about equals that from the dairy.

Brewster (J. H. CLARK). — Indian corn is in very good condition. Rowen is rather better than an average crop. White grubs are doing some damage, but otherwise the prospect for late potatoes is good. The prospect for the fruit crop, as a whole, is very good. Pasturage is in excellent condition. Oats and barley are about average crops. Very little attention is paid to poultry.

Eastham (J. A. CLARK). — Rowen is badly in need of rain. Late potatoes promise to be fair crops with no blight as yet. Apples fair; grapes good; and cranberries fine. Pastures are in good condition. The poultry industry is a large one, much greater than the dairy, and is increasing. Some fields of asparagus are rusting badly.

Wellfleet (E. S. JACOBS). — Indian corn is not raised. Rowen is a very good crop. Potatoes are above the average and no blight or rot has appeared. Apples are much above an average crop; grapes plenty; pears and cranberries below the average. Oats and barley are not raised in this section. It is regarded as a good investment to keep from 200 to 500 hens, but there are no large poultry raisers in town.

DUKES COUNTY.

West Tisbury (GEO. HUNT LUCE). — Indian corn is below the average. Rowen is in poor condition. The prospect for late potatoes is good; no blight or rot. Apples and grapes will give good crops. Some pastures are badly damaged by the white grub, otherwise condition good. Oats and barley are below average crops. Poultry farming is a little on the increase, and the income derived from it is about equal to that from the dairy.

NANTUCKET COUNTY.

Nantucket (CHAS. W. GARDNER). — Indian corn is in very fair condition. There will be no rowen, as it has been too dry for it. There will be a fair crop of late potatoes, though there is some blight. Pasturage is in very poor condition at this time. Oats and barley are about two-thirds crops. Some of our farmers have large flocks of poultry, and they all pronounce them more profitable than the dairy.

BULLETIN OF MASSACHUSETTS BOARD OF AGRICULTURE.

PRACTICAL HINTS FOR THE DAIRYMAN.

By Prof. F. S. COOLEY, *Mass. Agr'l College, Amherst.*

We have just passed one of the very trying seasons of the year for dairymen. The drying up of pastures, falling off of feed, August heat and flies make an adverse combination hard for the average feeder to meet. But improved management has not entirely ignored the needs of the past months, and we are becoming better and better able to overcome these difficulties. The successful dairyman finds it very important to prevent the shrinkage in milk, for it is apt to be permanent. Cows that fall off seriously in milk, owing to short feed, rarely regain their former product during the season, even if food is given later in abundance.

PARTIAL SUMMER SOILING.

While the writer is not an enthusiast over the soiling system, having experienced some of its difficulties, he is fully convinced of the necessity of providing some supplementary fodder for milch cows during July and August. Against those who advocate green feed throughout the season as more profitable than pasturage, I have no argument to make. I venture the opinion, however, that the novice will often enviously look at his neighbors' pastures during his first attempt at summer soiling. A good pasture is a great convenience on a dairy farm. Pastures do not, however, produce evenly throughout the season. There is always a surfeit in May and June and a shortage afterward. It is good husbandry to stock pastures heavily so that the early flush of feed may be utilized, as it checks a tendency to "grow wild" that has spoiled so many good pastures. Good husbandry also demands the provision of feed of some sort to eke out the pasture feed in late summer. The best feeders and most successful dairymen feed

some grain throughout the season. Some practise feeding silage in summer very successfully, and certainly at a less expense than soiling entails. It is believed, however, that in order to be successful, silage feeding in summer must be practised on at least a moderately large scale and so is not practicable for the small or average feeder.

Hay may be fed successfully and should be fed rather than let milch cows go hungry. On arable farms, hay forms an expensive feed as a rule, and economy dictates only a sparing use of it at any season. More than this, cows do not do so well on hay in summer as on a more succulent diet.

The average dairyman whose farm may be tilled without great labor, will find it good practice to grow green crops as an adjunct to his summer feed.

SOILING CROPS.

Rye. — One of the earliest soiling crops is rye. It may be grown so as to become available as a feed by the 10th of May. A succession may be secured by sowing at intervals from September 10 to the middle of October. Feeding should commence before the heads are in sight as rye rapidly deteriorates as a fodder and becomes unpalatable after it gets headed out. At its best, rye is a very watery feed, not especially nutritious and requires supplementary fodders of a dryer and more concentrated nature. Its principal value as a feed lies in its early appearance, hence it should be left out of a partial soiling system for late summer.

Clover. — Few forage plants surpass the medium red clover in practical utility. It possesses a value not likely to be overestimated, being palatable and nutritious to the animal, and beneficial in its effect upon the land. Red clover easily follows rye, makes a heavier growth of forage, and may be cut two or three times during the season.

I would advise feeding clover with a certain degree of moderation, and preferably in conjunction with other fodders, *e.g.*, millet or corn. Being very rich in protein, clover requires less of concentrates to complete the ration than most coarse fodders, hence the supplementary feed may be of a more starchy nature. Corn meal goes very well with clover, and the two make a ration well suited to milk production. On account of the difficulty of securing a really good clover hay and the waste and loss so often experienced, it seems to be good practice to feed clover green to as great an extent as can be advantageously done. The first cutting of clover comes at a time when pasturage is in full flush and extra forage not so much needed, but the after-cuttings are very acceptable additions to the milch cow's bill of fare.

A word on the treatment of clover may not be out of place. Belonging to that group of plants that possess the quality of bringing down valuable nitrogen to the soil, clover does not require so much nitrogenous manure as many crops. On the other hand, the mineral elements, phosphoric acid and especially potash, are particularly beneficial to clovers. I have observed repeatedly that the application of wood ashes or muriate of potash to grass lands serves to increase the proportion of clover. This fact should be borne in mind when seeding down, and manures containing preponderance of potash used when clover is desired. The oft-repeated statement that this crop benefits the land will bear repeating and emphasizing. Both directly by the nitrogen it leaves in the soil and indirectly by what it adds after being fed to farm animals, clover serves to increase the fertility of the farm. Dairymen should grow and feed as much clover as possible.

Grass. — As a convenience, grass may be fed to cows during haying time, either green, half dry or as new hay. It is at this season, and from seed time up to this season that labor is in demand on the farm, and that the greatest difficulties to the soiling system present themselves. If the pastures will take care of the dairy cows until haying is done, there is usually leisure to provide for them afterwards. While haying is in progress, a ration from the newly cut grass may be fed with little extra labor and it will be relished and well paid for by cows coming in from pastures already beginning to produce less bountifully.

Oats. — Following the hay crop, and the first crop of the season's sowing, oats form a valuable supplement to pasturage during the early part of July. They are relished by all classes of stock, are nutritious, succulent and have a very beneficial effect on milk production.

If peas or vetch are sown with the oats, an increased value is obtained by reason of the larger percentage of protein in the crop and the enrichment of the land in nitrogen, peas and vetch having the same effect as clover. I would recommend for forage purposes the sowing of three pecks to a bushel of vetch per acre on moist land with oats, and a bushel or a bushel and a half of peas on dryer land.

The oat crop requires liberal manuring and likes nitrogenous manures particularly, but owing to its growth-habits fresh application of green manure is not likely to prove as beneficial to it as to succeeding crops. Manure should be well rotted for oats, or perhaps, better yet, applied the preceding autumn. This method allows the nitrogen to become available, which is not the case to so great an extent if green manure is used when the seed is sown.

Fresh manure should rather be used with crops making a later growth, as for example corn. While the latter crop is making its heaviest growth during the last part of summer, nitrification is going on most rapidly, and the greatest possible benefit from the application of stable manure is obtained. Something of a succession may be secured by sowing oats at intervals, but it is not practicable to prolong the season of feeding this crop very greatly, as other heavier-yielding crops may now be secured.

Millet. — Among the newer and less familiar forage plants, millet is already recognized as one of growing importance.

Of the varieties of millet, the German and Hungarian are perhaps most familiar in this country, although the Japanese varieties are rapidly coming to the front. Through the efforts of Prof. Wm. P. Brooks of the Massachusetts Agricultural College, the introducer of the Japanese millets, Massachusetts farmers have already learned much of their value and are proving their merits. While other of these Japanese varieties may be of greater value for special purposes, the one that has thus far proved superior as a forage plant is the barn-yard millet (*Panicum crus-galli*). This millet, sown the middle of May in strong well-drained land and given liberal treatment, makes a rapid and heavy growth and is ready to feed the latter part of July and the early part of August, three or four weeks earlier than corn can be fed to advantage. At maturity the stalks stand five to seven feet high, and should cut from twelve to eighteen tons per acre of green forage. The stems are not woody as are those of some of the other varieties, but are succulent, tender and eaten with great relish by cows.

As millet is somewhat watery, it may be fed to advantage in conjunction with green clover or hay and a moderate ration of grain.

If pastures are large there is likely to be an abundance of dried June grass so that the cows will regulate their ration themselves by supplementing their millet feed with what the pasture affords.

The treatment for millet is between that for oats and Indian corn. The land should be mellow, in fine tilth, and manured in the fall, or with well-rotted manure in the spring. After harrowing in two pecks to a bushel of seed per acre, it is well to roll the land after seeding so as to give a hard surface for cutting. The quantity of seed depends somewhat on whether the land is free from weeds or not, land very free from weeds requiring less seed than weedy land.

Supplementary manures rich in nitrogen and potash may be substituted for barn-yard manure in part. Cutting should commence as soon as the heads appear and continue so long as the

plants are green. Haying this kind of millet is attended with much difficulty, and is to be avoided if possible. I would not grow more than could be fed green to advantage, unless it is convenient to ensile it, in which case it is entirely satisfactory though slower and more expensive to handle than corn.

Indian Corn.—No forage plant in the corn belt of America can equal Indian corn. Every dairyman is largely dependent upon it for his supply of both coarse forage and concentrates. Not only are the gluten and various corn feeds the cheapest concentrated fodders the milk producer can obtain, but the value of corn fodder fresh, dried, or ensiled becomes yearly more apparent. The “cow to the acre” problem comes nearer its solution in corn than in any other crop. The adaptability of soil and climate, the certainty of a crop, the usual heavy production and the ease and economy of culture all dictate the general cultivation of a good acreage of corn, while the animals fed are all partial to it in nearly every form. Whatever the crop system pursued, whether soiling, pasture, or any hybrid of the two, a liberal provision of corn fodder for the month of its maturity is the best possible practice.

The problem for the dairyman to consider is not whether to grow corn or not, but how much corn can my cows get away with, for the more corn the farmer grows and feeds, the more independent is he of feed markets and the fuller his pocketbook at the end of the season.

Always calculate to have a full supply of corn fodder, from the first variety that forms an ear till a week or more after frost has stopped its growth. A succession should be planned so that corn may form the staple fodder as long as possible. Select the earliest varieties that make a passable growth, follow with medium early varieties making a larger growth, and finally finish the season with the largest sort that comes to maturity. The cow's taste is not to be overlooked in the selection, and a decided preference may be observed for the sweet varieties over the flint corns, and especially over dent varieties which have too coarse woody stalks to feed to the best advantage.

Some fallacies in corn culture are prevalent. One of the common ones is that of too thick planting. The maximum feeding value is obtained in corn making a full ear. The ideal planting secures just as many stalks as will produce fully developed ears. If corn is sown so thickly that no ears form, neither the quantity nor quality of forage are increased and there is a loss of seed. Another common notion that corn in blossom is in its best feeding condition is an error. Corn never improves in feeding value faster than from the silk to the glazing stage. Cows fed upon

immature fodder do not milk so deeply as when fed upon fodder, with ears fully developed, although they consume much more of the former. Immature fodder has so much water that a cow can hardly eat as much as she needs. The rule should be to get corn ripe as fast as possible for feeding and feed from the ripest to be had.

Some interesting facts in corn-manuring have lately been developed, among the more important of which is the especial benefit of independent application of potash (muriate of potash) to the crop. The stover and grain both are materially increased in central and western Massachusetts by adding potash to the farm-yard manure applied. Corn, as has been previously observed, is well suited in its growth-habits to receive full benefit from fresh manure. The heaviest growth comes at the season of rapid nitrification. On the one hand, liberal supply of plant-food is received, on the other, waste of fertility is prevented by manuring corn with farm-yard manure.

Ensilage is the cheapest winter feed produced upon our farms, and while advocating a large provision of corn for that purpose, we insist upon its liberal use as a supplementary feed in the advanced pasture season.

Barley and Peas. — Another trying season for the dairyman is after the frosts have cut the corn and before cows are put upon winter feed. Pastures are short and feed grows very slowly. The resort of many is to feed off mowings, a practice that does not find favor with the most successful. The cost of haying is greatly increased when a large area must be gone over in securing the crop. Fall feeding does not compensate the shrinkage of the succeeding hay crop. Hence at this season a crop not affected by early frosts, growing well in cool weather, and palatable to cows has a peculiar value. Barley and peas, or barley alone may be sown about the first of August, after haying is done, on old land or land newly ploughed, manured with the stable accumulations during the summer and put in fine tilth so that a good crop of forage may be cut after frost has killed corn. About two bushels of barley and a bushel or a bushel and a half of peas per acre is recommended. This forage, though it does not make a particularly heavy growth, is clear gain. Cows eat it with great relish. It is splendid feed for milk production, and bridges over one of the most difficult seasons. One of the strongest advantages of the crop lies in its immunity from frost. I have had barley and peas continue to grow and keep green after hard frosts were of nightly occurrence and even until the ground froze stiff.

COW STABLES.

While perchance this presentation of feeding may commend itself at a season when we realize our needs, the time is past for us to remedy present conditions of feed this summer, and it is still early to lay definite plans for next season.

The need of preparing winter quarters for dairy stock will soon be felt, and in the course of the next few weeks necessary improvements and alterations should be made. We see the necessity of good stable sanitation more clearly than formerly. The past few years have taught Massachusetts dairymen an expensive lesson, and one, therefore, not soon to be forgotten. I do not propose to determine whether the State has dealt wisely or not with its cattle. It may have done both since it has gone from one extreme of cattle inspection to another in a very short time. Those in charge of the cattle interests in Massachusetts have doubtless learned much in the matter. The least that the State can do is to try and teach farmers the needs of the time with regard to maintaining the health of cattle. We often hear of the good health of the cattle in our grandfathers' times. Tuberculosis was not then invented. Ill health among cows was almost unknown, etc. Perhaps the immunity of that generation is partly in imagination and in the forgetting of many hardships during the years that have intervened. Certain it is, in the human family disease was not then less prevalent than now. The non-existence of tuberculosis in cattle fifty years ago seems rather improbable, if we can credit the statements of *Columella*, made nearly two thousand years ago. This old Roman describes a disease among cattle called "ulceration of the lungs," and says "that they die not, you must bore a hole in the left ear and insert a root of the lung wort."

But granting that bovine tuberculosis is not "a new thing under the sun" there can be little doubt that our generation has seen far greater loss as a result than has formerly been recorded. This is not because of any radical change in the character of the malady, but rather in a change of the conditions in which cattle are kept. That our cattle are subjected to different conditions from those which formerly obtained no candid observer will deny. The forcing of dairy stock to abnormal production under high pressure has been productive of serious results.

Of these conditions, that of feed, which has been charged with so much influence, we will pass over merely observing that within reasonable limits the feed, provided it is wholesome and palatable, does not have so adverse an effect upon the health as is sometimes supposed. True, overcrowding the cow with rich feed does often

seriously impair her health, but far more often this is in conjunction with too close confinement.

Dairy Cattle need Pure Air. — I have been in stables where in winter weather the air was so warm that a coat was superfluous. The cows were standing huddled together in stalls so low that my head bumped the joists above. The mangers were tightly closed in front, and there was only a few feet between the cows' tails and the side of the building. I computed the air space in one of these stables and found only 240 cubic feet per cow. If a cow only requires four times as much as a man, this is equivalent to shutting a man in a room 6 feet long, 2 feet wide and 5 feet high. He must not only sleep in such a room, but spend the entire winter there eating, drinking and never leaving it. To complete the comparison we must add to such confinement the drain to the system due to maternal functions, which are very severe in the good dairy cow. Is it any wonder that cows kept in this condition are alarmingly subject to tuberculosis? Is it any wonder that the trouble has rapidly increased? The wonder is that we have gotten off so easily for so transgressing nature's laws. The remedy for this evil lies in rational stable management. We must give our cows more fresh air and sunlight. We must clean up the filth, disinfect the old stables, provide proper ventilation, and put windows into dark stables.

The State has learned a lesson from the wholesale slaughter of tuberculous cattle, but there is still need of a carefully planned system of inspection which aims at the improvement of stables and seeks to make the conditions in which cattle are kept favorable to overcoming the encroachments of disease.

Three things are necessary for a healthy stable : —

1. Cleanliness (filth is the harbinger of disease).
2. Pure air (foul air is a menace to health).
3. Sunshine (the best germicide).

CARE OF MILK.

One of the most important points in successful dairying is neatness and care in the handling of milk. During my study of the creameries in the State I have been struck by the degree of interest which individuals are manifesting in the crusade against slovenliness in the care of milk. The management of nearly every creamery is considering some means of securing increased care of the cream brought in by the gatherers. Some of these by dint of constant hammering away, and repeated visits to dairies have accomplished much in securing a better order of things. Others

are discouraged by the difficulties offered to the manufacture of good butter from cream carelessly produced. No dairyman who sells his product individually can achieve the highest success, who does not pay great attention to cleanliness in every detail of the handling of milk. The creamery patron must realize that he is serving his own interest as well as that of all members of the association by similar attention to details. Not only do experience and good practice dictate especial attention to cleanliness, but recent scientific discoveries have drawn out the strongest reasons for it in the fact that filth is the harbinger of all manner of injurious and destructive bacteria. The keeping quality and commercial value of nearly all dairy products is to a certain extent determined by the cleanly methods in which they are produced.

The need of pasteurization was much emphasized by filthy methods of production, and was at best only a partial remedy for the evil. Good milk produced in a thoroughly clean manner from healthy cows and kept in a cool and wholesome place is rarely improved by pasteurization.

QUALITY OF COWS.

While all dairymen recognize the fact that some cows are better than others, and that good cows are more profitable in the dairy than poor ones, few realize the difference in value between the different grades.

Much has been said and written in general terms upon the importance of keeping better cows, but few have attempted an estimate of the amount of this advantage.

Alvord estimates the value of a cow as equal to that of her annual product. On this basis the average value of cows in the United States is set at thirty dollars. The average annual product for dairy cows is 3,000 lbs. of milk, or about 1,400 qts.; or stated in another way, 130 lbs. of butter and 1,100 qts. of skim milk.

At 2½ cents per qt., 1,400 qts. of milk is worth . . .	\$31 50
At 20 cents per lb., 130 lbs. of butter is worth . . .	\$26 00
Adding to the above the value of 1,100 qts. skim milk at ½ cent per qt.,	5 50
We get	<u>\$31 50</u>

On the same basis a good cow is worth \$75.

The cost of keeping the average cow in the United States is not far from thirty dollars a year. In Massachusetts both the value of the product and the cost of keeping are somewhat increased,

but the net profits remain about the same. In other words, take the country through, the average cow just about pays her keeping. This state of things reduces the profits of dairying to a very small sum on the average, and finds its defence mainly in the fact that the dairyman has found a home market for his crops at a fair price, when without his cows it might be difficult to dispose of them.

It is thus seen that the average cow, producing 1,400 quarts of milk, or 130 lbs. of butter per year, will not figure prominently in lifting mortgages from our Massachusetts farms.

It is generally believed, however, that keeping a better grade of cows yields a larger profit. Accepting this as a fact, let us briefly consider the extent to which the value of cows is enhanced by their increased productiveness.

Without gainsaying the close relation between the value of a cow and her annual product, as stated by Alvord, I would like to submit another scheme of valuation based on the net profit which she earns her owner. This basis of value is as follows. A cow must pay for the feed she consumes and six per cent interest, and two per cent taxes on her beef value. Whatever is left to her credit after paying maintenance, interest and taxes is profit. This profit increases her beef value by the amount on which it will pay interest and depreciation. Six per cent interest is ample, but the depreciation is great in good cows. To prevent loss, sufficient allowance should be made to cover her value in from two to four years. While the average usefulness is more than four years, the risk is so great it is wise to err on the side of conservatism in estimating values. If we take the moderate factor of three years' usefulness, then a cow must pay thirty-three and a third per cent depreciation on her cost annually. Adding this to the interest, we have forty per cent in round numbers. Upon this basis a cow is worth the sum above her beef value, on which the profits over her keeping will pay forty per cent. In other words, the value of a cow is two and a half times her annual profit added to what she is worth for beef. To illustrate the working of this method. An average cow costs thirty dollars for annual maintenance, interest and taxes. Her product is worth thirty dollars. She earns no profit, and is worth her beef value, say twenty-five dollars. A better cow costs thirty-five dollars for annual maintenance, interest and taxes. Her product is worth forty-one dollars, of which six dollars is profit. Two and one-half times this profit added to twenty-five dollars, her beef value, is forty dollars, which is the value in this case. No one doubts but that the cow which earns her owner six dollars a year profit is worth forty dollars to him as

quickly as the cow which earns no profit is worth twenty-five dollars. This is, however, a very conservative statement. If we apply our basis of valuation to some of the better and rarer cows, we shall be more strongly impressed with the desirability of keeping that kind of stock. While the average cow produces only 1,400 quarts of milk a year, or 130 lbs. of butter, herds are occasionally met with in which the annual product is 3,000 quarts of milk, or 300 lbs. of butter. The cost of feeding in such herds is somewhat more, and very accurate accounts place it at about \$50 per cow. Three thousand quarts of milk at $2\frac{1}{4}$ cents is worth \$67.50, making a profit of \$17.50. Adding two and one-half times this profit to the beef value we shall get \$68.75 as the dairy value of such cows.

The writer has found even better herds than this, herds that would average 4000 qts. of milk in which the best individual gave 5000 qts. or more. A 5000 qt. cow yields a product worth \$112.50. If her keeping costs \$75 the profit amounts to \$37.50, and on the foregoing basis her value is \$118.75. There is no doubt but that these high values for the best cows are *real* values. The profits received easily justify the payment of such sums for such cows. More than that if such cows continue their production for more than three years, there is a very handsome surplus made which is utterly impossible with ordinary animals.

Know what your cows are doing.—The difficulty of selecting and maintaining a herd of the best dairy cows lies in the farmers' imperfect knowledge of what each cow is doing. In a general way farmers think they know which is their best cow, or which is their poorest, and they have perhaps a fairly accurate idea of the relative excellence of individuals in the herd.

Very rarely, however, is a dairyman well informed on the profit and loss phase of his business. I would strongly urge the recording of each cow's product by weighing daily, or at regular intervals, the milk, supplementing this information by occasional Babcock tests, and from this data computing the annual product both in pounds of milk and in pounds of fat. Many surprises would come to the dairyman if such records were kept. The cow that started in so big and then went dry four months could be justly compared with the one that maintained a moderate flow throughout the season. It might often be found that neither the biggest milker nor the richest cow gave the largest yield of fat in a year. Some favorites might be found lacking, while some plain, common, everyday cows might prove pillars of their owners' credit. Accurate records of product and cost for each cow are valuable and profitable in many ways.

1. They enable us to weed out the herd, selling the unprofitable members, retaining those that pay dividends, and replacing those sold with money makers. In the absence of such records it is impossible to do this with certainty.

2. They serve as a tab on the milkers. Where daily weighings are recorded, any variation is noticed and traced to its cause. If a cow is not milked clean the fact is discovered. Poor work is in this way discouraged. A larger product will be secured, and the danger of drying off from imperfect milking will be lessened.

3. Disorders in cows are more quickly discovered and checked. If a cow goes off her feed her daily record gives the first indication, and at that time serious loss can generally be averted, while if knowledge is delayed until obtained in other ways, serious results are often experienced.

4. It stimulates both owner and help to increase the product to its limit, to do better this year than was done last year, and it educates both alike in matters of dairy economy.

5. It induces business methods in dealing with farms and dairies, places where business methods have been so much ignored. This is the rock over which many farmers break. One might almost say that the greatest drawback to success in all branches of farming is lack of business methods, *i.e.*, regular balancing of accounts with various farm operations. If commercial houses, or manufacturers or builders were as negligent about the record of receipts and expenses or profit and loss, in their various transactions as are farmers, their better informed competitors would soon drive them to the wall. Even the very small leaks in fuel, postage and other items of expense are most carefully studied and guarded against.

CO-OPERATION.

Another great drawback to successful dairying is the lack of confidence between producers. I have not the time or space to discuss its wherefore but must content myself with the bold statement of facts. *Farmers will not work together.* In all other lines of business, co-operation is the rule of the hour, and in it do men find promise of profit. Railroads are fast consolidating, and manufacturers of every sort of product are forming trusts. All lines of business are securing new combines almost daily, and in them do men find relief from the heat of competition. Farmers alone combat each other and play into the hands of their opponents. I have known creamery after creamery ruined because its patrons would not support it. Farmers on every hand sign iron-clad contracts with powerful combines, but with each other the most tentative agreements fail to be effective. The proverbial independence of the farmer appears to be his own worst enemy.

MASSACHUSETTS
CROP REPORT

FOR THE

MONTH OF SEPTEMBER, 1899.

ISSUED BY

J. W. STOCKWELL,
SECRETARY STATE BOARD OF AGRICULTURE.

BOSTON:
WRIGHT & POTTER PRINTING CO., STATE PRINTERS,
18 POST OFFICE SQUARE.
1899.

CROP REPORT FOR THE MONTH OF SEPTEMBER, 1899.

OFFICE OF STATE BOARD OF AGRICULTURE,
BOSTON, MASS., Oct. 2, 1899.

Bulletin No. 5, Crop Report for the month of September, is herewith presented. We desire to call the particular attention of our readers to the article on "Birds as Destroyers of Hairy Caterpillars," by E. H. Forbush, ornithologist to the Board.

PROGRESS OF THE SEASON.

The September returns of the United States Department of Agriculture (Crop Circular for September, 1899) give the condition of corn on September 1 as 85.2. There was a decline during August of 4.7 points, but the condition on September 1 was still 1.1 points higher than at the same date last year, 5.9 points higher than the corresponding date in 1897, and 2.9 points above the mean of the September averages of the last ten years.

The condition at harvest of winter and spring wheat consolidated was 70.9, as compared with 86.7 last year, 85.7 in 1897, and 82.5, the mean of the September averages of the last ten years. The condition on September 1 was the lowest September condition for twenty years.

The average condition of oats was 87.2, against 90.8 last month, 79 last year, 84.6 in 1897, and 80, the mean of the September averages of the last ten years.

The average condition of barley was 86.7, against 93.6 last month, 79.2 last year, 86.4 in 1897, and 84.1, the mean of the September averages of the last ten years.

The condition at harvest of winter and spring rye consolidated was 82, as compared with 89.4 last year, 90.1 in 1897, and 87.5, the mean of the September averages for the last ten years.

The average condition of buckwheat was 75.2, as compared with 93.2 last month, 88.8 last year, 95.1 in 1897, and 88, the mean of the September averages of the last ten years.

The average condition of cotton was 68.5, as compared with 84 last month, 79.8 last year, 78.3 in 1897, and 78.4, the mean of the September averages for the last ten years. The serious decline in condition is mainly the result of the long-continued drought.

No average condition for the entire country can be established for tobacco, but there was a general improvement in condition during August in most of the important tobacco-growing States.

The average condition of potatoes was 86.3. This shows a decline of 6.7 points during the month, but the condition is still 8.6 points higher than last year, 19.6 points higher than in 1897, and 9.3 points above the mean of the September averages of the last ten years.

The acreage devoted to clover seed is considerably less than last year and the condition in the main unfavorable.

There was an improvement of 5 points during the month in the condition of sugar cane in Louisiana, with practically no change in other States.

There has been a decline since the last report in the condition of rice, except in Florida and Mississippi, where there has been a gain of 28 and 18 points respectively.

The former unfavorable reports on the apple crop have been more than verified by subsequent developments, there having been a loss in condition during August in all the principal apple States, with the exception of Indiana.

Although no quantitative estimate of the total production of peaches can be made, it is obvious that the peach crop of 1899 has been one of the smallest on record. Of the really important peach-growing States, California alone reports a good crop.

In the north Atlantic States the grape crop is considerably above the ten-year average; in the south, in the central Mississippi valley and on the Pacific slope it is less satisfactory.

The number of stock hogs for fattening is estimated at 7.9 per cent less than on September 1 of last year. The condition is 95.9, which is 0.2 points below last year but 1.6 points above the mean of the September averages of the last ten years.

In Massachusetts the average condition of corn September 1 is given as 95; the average condition of rye when harvested as 88; the average condition of oats when harvested as 91; the average condition of barley when harvested as 85; the average condition of buckwheat as 89; the average condition of potatoes as 95; the average condition of apples as 44; the product of peaches compared with a full crop as 13; the average condition of grapes as 92; the average condition of tobacco as 98; the number of stock hogs compared with last year as 95, and their average condition as to size and weight as 99.

TEMPERATURE AND RAINFALL FOR THE WHOLE COUNTRY.

(FROM UNITED STATES CLIMATE AND CROP BULLETINS.)

Week ending August 28. — The week was warmer than the average in all districts east of the Rocky Mountains, except on the southern New England coast. Over the plateau and Pacific coast regions, except along the central and northern California coast, where nearly normal temperatures prevailed, the week was cooler than usual. While heavy rains occurred over portions of the middle and south Atlantic States, and over local areas in the Gulf States, central valleys and Lake region, the precipitation over much of the greater part of the country was less than the average, extensive areas in the central valleys, Lake region and west Gulf States receiving no appreciable amount.

Week ending September 4. — The week averaged cooler than usual in central and northern California, Oregon and over the greater part of Washington. The conditions in the Gulf and Atlantic coast districts approached very nearly to the normal, but over nearly the whole of the country the week averaged warmer than usual, being decidedly warm throughout the Lake region, central valleys and in the middle and southern Rocky Mountain regions. The rainfall exceeded the average on the west Gulf coast, over portions of the south Atlantic and east Gulf States, and over areas more or less extensive in the upper Mississippi and upper Missouri valleys, Lake region and New England. Over much the greater part of the country, however, the rainfall was below

the average, with an entire absence of rain over large areas. The greater part of the country was suffering from more or less severe drought.

Week ending September 11. — The week was cooler than usual in New England, New York, throughout the central plateau region, Oregon and California. Throughout the southern and middle Atlantic States, the Lake region, the central valleys and the eastern and southern Rocky Mountain slopes the week was generally much warmer than usual. There was more than the usual amount of rainfall in a belt of country extending from Arizona and New Mexico up to and into the central valleys, and also in portions of the southern, south Atlantic and Gulf States. Over New England, the lower Lake region, along the Atlantic coast, generally throughout the southern States and in the north-west there was a deficiency. The drought was generally relieved throughout the central valleys and the middle and south Atlantic States.

Week ending September 18. — The week averaged decidedly cool in the middle Atlantic States and New England, and was slightly below the normal over the greater part of the Lake region and in portions of the Mississippi and lower Missouri valleys. The week was warmer than usual in the central and west Gulf States, interior of California and in the north Pacific and northern plateau regions. Elsewhere nearly normal temperature conditions prevailed. There was more than the average amount of rain in eastern Florida, along the immediate coast from Massachusetts to southern New Jersey and over areas in the central valleys. From the east Gulf coast northward over Tennessee, the upper Ohio valley and the Lake region there was no appreciable rainfall, and also throughout the central and southern Pacific coast regions.

Week ending September 25. — Throughout the central valleys, Lake region and Gulf States the week averaged cooler than usual, being decidedly cool in the Lake region and central Gulf States. There was also a slight deficiency over northern New England. Over southern New England, the middle Atlantic States, throughout the Rocky Mountain

district and on the Pacific coast the week was warmer than usual. There was more than the average precipitation during the week in New England, the middle Atlantic States, upper Ohio valley, the greater part of the Lake region and over a few local areas in the Gulf States. The rainfall was very heavy over portions of the upper Lake region, middle Atlantic States and New England. Over much the greater part of the country, however, there was less than the usual amount of rainfall.

SPECIAL TELEGRAPHIC REPORTS.

(WEATHER BUREAU, BOSTON.)

Week ending August 28. — New England. Boston: Showers generally improved crops in southern half of district; drought continues very severe in northern sections, damaging late potatoes and corn; ground generally too dry for ploughing and seeding; good crop apples assured in small sections of Rhode Island and Connecticut; tobacco and cranberries promise good crops.

Week ending September 4. — New England. Boston: As a whole, crops greatly improved by showers Thursday and Friday; drought still unusually severe in parts of Maine, New Hampshire and Vermont, where corn is much injured; tobacco in good condition, bulk cut; apples maturing, good condition; cranberries being picked in good condition.

Week ending September 11. — New England. Boston: Fair, cool weather favorable to harvesting and thrashing grain; all crops progressing toward maturity, and now little chance of damage by frost; general need of rain; high winds in Maine did much damage to apples.

Week ending September 18. — New England. Boston: Frost during week damaged late corn, mostly in northern districts, and killed vines, tomatoes and beans in many sections; cranberries also somewhat damaged by frost; half of corn crop cut; potato digging at its height; good crop of apples in parts of Rhode Island and Connecticut, picking beginning; rain much needed, too dry for ploughing and seeding.

Week ending September 25.—New England. Boston: Copious rains first of week very beneficial, putting ground in condition for fall ploughing and seeding and improving late crops; excepting light hay and apples, all crops yielding near average; tobacco hanging; corn generally cut; potatoes half dug; cranberries two-thirds picked; as a whole season fairly satisfactory.

WEATHER FOR SEPTEMBER, 1899.

The month of September opened with generally cloudy weather. This unsettled weather culminated in showers on the night of the first and morning of the second of the month. These were of general occurrence, falling in parts of all sections of the State. The rainfall was most welcome and resulted in much benefit to the crops' interests. The temperature conditions were a continuation of those of the closing week of August, and ranged near the normal for the season. The second week of the month was generally fair, with more than the average amount of sunshine. The light showers were mostly of local origin and were very unevenly distributed. These, however, maintained growing and maturing crops. The average temperature showed a sharp falling off, ranging from 4° to 6° lower than for the preceding week. The cool weather was favorable to farm work generally and to curing tobacco. The fair weather, generally sunny, continued through the 19th. During a cool period from the 14th to the 16th light to moderate frosts were of frequent occurrence. No serious or extensive damage resulted, the injury, where any, being chiefly to vines and late-planted corn. The temperature for the week ending the 19th was six degrees below that of the preceding week and several degrees cooler than the normal for the season. General rains fell on the 20th and the 21st of the month. These were copious for the larger portion of the State, and especially in the eastern counties, where the greatest need existed. The rain was too late to be of great benefit to long-suffering crops, which had either perished or reached their growth and were maturing. It was, however, of great and immediate benefit to pastures and meadows, and in moisten-

ing the soil, which had in the majority of localities become too dry for ploughing and fall seeding. With the rain came warmer weather, the daily range of temperature being from four to six degrees higher than for the preceding seven to ten days. The closing week of the month was a mixture of cloudiness and showers, but the major portion of the period was fair weather. Nearly average temperature prevailed, with cool nights, especially on the 28th and 29th, when moderate to killing frosts occurred in many localities. There were less than the usual number of muggy, oppressive days during the month, and as a whole the weather was exceptionally fine and pleasant.

In the circular to correspondents returnable to us September 23 the following questions were asked :—

1. How does Indian corn compare with an average crop?
2. Are rowen and fall feed up to the usual average?
3. Has the average amount of fall seeding been done, and what is its present condition?
4. How does the onion crop compare with an average crop?
5. Are potatoes an average crop in yield and quality?
6. What is the prospect for root crops, celery and other late market-garden crops?
7. How have apples, pears, peaches, plums, grapes and cranberries turned out?

Returns were received from 167 correspondents, from which the following summary has been made :—

INDIAN CORN.

Throughout the State Indian corn is a good average crop, and probably rather more in the western counties. There are some complaints of its not having eared out well, and also of the ears being short, but on the other hand many correspondents say that it has eared out more heavily than usual. There has been little injury from frost, and the crop is now practically all secured. The stover is generally luxuriant, and promises to be of good nutritive value.

ROWEN AND FALL FEED.

The drought of the first part of the month, added to the poor condition then existing, has reduced the rowen crop much below the usual average, and in many sections it is practically a failure. Fall feed is also sadly off in condition, and much rain is needed in future to bring grass roots to a proper condition for the winter.

FALL SEEDING.

Less than the usual amount of fall seeding has been done, on account of the dry weather, which has made the ground too dry for ploughing and seeding. That which has been put in is also below the average in condition, though the recent rains have doubtless much improved it.

ONIONS.

Onions are generally a good crop, considerably above the average on the whole. In the Connecticut valley they are yielding particularly well, though there is some complaint that they are not curing properly. Blight is not reported, and aside from the objection above noted the crop is generally in good condition.

POTATOES.

Potatoes are an exceptional crop in almost all sections, both in yield and quality. The yield is generally spoken of as large, and often as the largest for years. Rot has not appeared, owing probably to the dry, cool weather, and aside from damage from grubs in some sections the quality of the crop is excellent.

ROOT CROPS, CELERY, ETC.

Root crops have suffered somewhat from drought in many localities, but the recent rains have doubtless improved them, and with sufficient rain in future they should yield well. Celery will be a good average crop, judging from the

returns at hand, which are not numerous. Other late market-garden crops are doing fairly well, and generally promise average yields, though injured by drought in many cases.

FRUITS.

Apples are a very poor crop except in a few local areas, where more favorable conditions are reported. Pears are not over half a crop, plums even less, and peaches were practically a failure. Grapes were generally abundant and have been mostly secured without injury from frost. Cranberries are rather more than an average crop in the regions of commercial production, and are of good quality. Little injury from frost has been reported.

NOTES OF CORRESPONDENTS.

(Returned to us September 23.)

BERKSHIRE COUNTY.

Monterey (WM. S. BIDWELL).—Indian corn is a full average crop. Rowen is a short crop and fall feed is 30 per cent off in condition. The usual amount of fall seeding has been done and it is now in good condition. Potatoes have made a fair yield of superior quality. The prospect is normal for root crops, celery and other late market-garden crops. Apples are half a crop; pears half a crop; no peaches, plums or grapes grown.

Tyringham (GEO. F. KOPP).—Corn is a good average crop. Rowen and fall feed were never in better condition. The usual amount of fall seeding has been done and it is looking well. Onions have made a fair crop. Potatoes made a very large yield and are of extra quality. The prospect is good for root crops, celery and other late market-garden crops. Apples have made a good yield and there will be a good many shipped. The tobacco crop has been all secured and will be extra good if it cures well.

Alford (L. T. OSBORNE).—Indian corn is the best crop in this section we have had in ten years. Rowen and fall feed are about average in condition. Fall seeding is a little backward on account of dry weather, but about the usual amount has been put in. Potatoes are 10 per cent above the average in yield and quality. Apples are about 40 per cent of a full crop and are selling at \$1.25 to \$1.50 per barrel.

Stockbridge (F. A. PALMER).—Indian corn is an average crop. Rowen and fall feed are up to the usual average. Not as much fall seeding as usual has been done, owing in part to dry weather. Onions are 5 per cent above an average crop. The prospect is very good for root crops, celery and other late market-garden crops. Apples are about 65 per cent of an average crop; pears the same; plums and grapes average; no peaches.

Becket (WM. H. SNOW).—Indian corn is a full average crop and some call it the best ever grown. Rowen is up to the average, but pastures are short. The usual amount of fall seeding has been done, but it does not look as well as in some years. Onions are an average crop. Potatoes are an average crop in yield and quality. Root crops do not promise well, but celery looks well. There is a fair crop of fruit.

Washington (E. H. EAMES).—Corn is about the same as last year. Rowen and fall feed are up to the usual average. Not much fall

seeding has been done as yet. Potatoes are a large crop, but they are rotting badly on some fields. Late market-garden crops are raised only for home use. Apples are about half a crop; other fruits not raised.

Richmond (T. B. SALMON).—Indian corn is a full crop. Rowen and fall feed are not up to the usual average. Less than the usual amount of fall seeding has been done, but it is in good condition. Very few onions are raised. Potatoes are an average crop in yield and quality. Apples are a good crop; pears small crop; no peaches; very few plums; grapes average.

Peru (J. P. SENNETT).—Indian corn is a fair crop, though about ten days later than usual. Rowen and fall feed are rather light on account of the dry weather. Very little fall seeding has been done, but that put in is doing well. Onions are not raised here. Potatoes are a large yield of excellent quality. Root crops promise well. Apples are a fair crop. No killing frosts have occurred as yet.

Cheshire (L. J. NORTHUP).—The corn crop is the best for a number of years. Rowen and fall feed are not quite up to the average. It has been so dry that less fall seeding than usual has been done, but more will be done later. Potatoes are more than an average crop and the quality is the very best. Cabbages are looking well; turnips a fair crop; celery and root crops about average. Apples are more plenty than was expected; other fruits not up to the average by 40 per cent.

New Ashford (ELIHU INGRAHAM).—Indian corn compares well with an average crop. Rowen and fall seed are not up to the usual average. The usual amount of fall seeding has been done and it is in good condition. Onions are a good crop. Potatoes are above the average in yield and of good quality. The prospect is good for root crops, celery and other late market-garden crops. Apples are plenty.

FRANKLIN COUNTY.

Heath (O. D. CANEDY).—Indian corn compares well with the average. Rowen and fall feed are not up to their usual condition at this time of year. The usual amount of fall seeding has been done and it is looking well. Potatoes are more than an average crop of very fine quality. There are but few apples; pears not plenty; peaches and plums but few; grapes plenty.

Colrain (A. A. SMITH).—Indian corn is about 10 per cent off from the average. Rowen and fall feed are up to the usual average. The usual amount of fall seeding has been done and it is in good condition. Onions are a full crop. Potatoes are above the average in yield and quality. The prospect is good for root crops, celery and other late market-garden crops. There is about a three-fourths crop of all kinds of fruit.

Leyden (U. T. DARLING).—Indian corn is about an average crop. Rowen and fall feed are not up to the usual average. The usual amount of fall seeding has been done and is looking very well, considering the dry weather. Potatoes are better than an average crop and are of good quality. There is a very light crop of all kinds of fruit.

Shelburne (G. E. TAYLOR). — Indian corn is 10 per cent off from an average crop. Rowen is a two-thirds crop, and fall feed is very short. The usual amount of fall seeding has been done and it is looking well. Potatoes are uneven, some fields yielding lightly and others abundantly. A very few apples and grapes are all the fruit we have. Corn that came up late has not yet matured.

Conway (J. C. NEWHALL). — Corn is a full average crop, though some pieces are late. Rowen is less than an average crop, but fall feed has grown very fast since the rains. Most of our fall seeding is done after tobacco, and it is looking very well, though somewhat late. Potatoes are yielding very well and the quality never was better. Root crops, celery and other late market-garden crops promise well, though not much raised. Fruit is generally a short crop. Tobacco is a fine crop this season and is selling for good prices.

Whately (FRANK DICKINSON). — Corn is rather late, but above the average in condition. Rowen and fall feed are off in condition. The usual amount of fall seeding has been done and it is coming forward well. Onions are a heavy crop. Potatoes are fair in quantity and good in quality. The prospect for root crops, celery and other late market-garden crops is good. Grapes are a fair crop; other fruits poor.

Montague (C. S. RAYMOND). — Indian corn is more than an average crop. There is but a light crop of rowen, and fall feed is very short. The usual amount of fall seeding has been done, but it is not in good condition. The onion crop is immense in yield. Potatoes are more than an average crop, quality excellent. Root crops are very good; celery not looking as well as usual; cabbage and other market-garden crops very good. All fruits give very short crops. Tobacco is a fine crop.

Erving (C. F. CLARK). — Indian corn is more than an average crop. Rowen and fall feed are not up to the usual average. The usual amount of fall seeding has been done and it is in good condition. Onions compare favorably with an average crop. Potatoes are an average crop in yield and quality. The prospect is good for root crops, celery and other late market-garden crops. The yield of apples, peaches and plums is light.

Orange (ANSEL HARRINGTON). — Indian corn is about an average crop and was mostly put into the silo. There is about one-third crop of rowen, and fall feed is short. Not much fall seeding has been done and that put in is backward because of dry weather. Potatoes are below the average in yield but of excellent quality. Late market-garden crops promise to be about average. Fruit of all kinds is not over a one-fourth crop.

New Salem (DANIEL BALLARD). — Indian corn appears to be a full average crop. Rowen and fall feed are below the average. Considerable fall seeding has been done in corn, but owing to the drought it is not in very good condition. Potatoes have yielded finely and are of excellent quality. Root crops, celery and other late market-garden crops are looking well. There is a medium crop of apples; few pears; no peaches; and a fair yield of grapes. Chestnuts, walnuts and butter-nuts will be plenty.

HAMPSHIRE COUNTY.

Greenwich (WM. S. DOUGLAS).—Indian corn is a fair average crop. Rowen and fall feed are off in condition. The usual amount of fall seeding has been done and it is looking well. Potatoes are a good crop as regards both yield and quality. Apples, pears, peaches, plums and grapes are short; cranberries good.

Amherst (H. A. PARSONS).—Corn has made a good growth and ripened well, though pieces standing on the night of the 15th were injured by frost. Rowen and fall feed are light. The usual amount of fall seeding has been done and it is in fair condition. Onions are a large crop. Potatoes are an average crop in yield and quality. The prospect for root crops, celery and other late market-garden crops is good. Apples good; pears poor; peaches a failure; and grapes good.

Belchertown (H. C. WEST).—Indian corn is two weeks late and a few fields have been injured by frost, otherwise it is an average crop. There is very little rowen here, and fall feed is short. Much more than the usual amount of fall seeding has been done and it is starting finely. Onions are a good crop though little raised. Potatoes are far above the average both in yield and quality. Apples as a whole are a short crop, but in places they are abundant and fine in quality; very few pears; no peaches; no plums; grapes plenty; cranberries fair.

Granby (GEO. A. BLISH).—Indian corn is a good average crop. Rowen and fall feed are not up to the usual average. The usual amount of fall seeding has been done, and though the seed is only just up there appears to be a good catch. Potatoes are more than an average crop. Root crops, celery and other late market-garden crops have suffered from drought. The fruit crop is very light.

Westhampton (H. A. PARSONS).—Indian corn is a full average crop. Rowen and fall feed are up to the usual average. The usual amount of fall seeding has been done and it is in good condition. The prospect is good for root crops, celery and other late market-garden crops. Apples are a one-fourth crop; no peaches or pears; grapes a three-fourths crop.

Williamsburg (F. C. RICHARDS).—Indian corn is a full average crop. There is not more than half a crop of rowen. Onions are not raised here. Potatoes are a full average in both yield and quality. The prospect is good for root crops, celery and other late market-garden crops. Apples are not over one-fourth of a crop; pears light; no peaches.

Cummington (S. W. CLARK).—Corn has made a good growth, fully average, but not very well ripened as yet. Rowen and fall feed are below the average on account of dry weather. Very little fall seeding has been done. Potatoes are of extra quality, but not a heavy crop. Root crops, celery and other late market-garden crops promise to be about average. Grapes are good; apples less than half a crop; other fruit very light. On the night of the 7th a local hailstorm destroyed fully one-half of our light apple crop, besides breaking much glass and injuring stock somewhat.

Goshen (ALVAN BARRUS).—Corn is about 5 per cent off from the average. Rowen is a little below an average crop, but fall feed is fairly

good. The usual amount of fall seeding has been done and is in good condition. Potatoes have been seldom, if ever, a better crop. Root crops, celery and other late market-garden crops give promise of being about average. Apples are one-fourth of a crop; pears one-tenth; no peaches or plums; grapes 100; and cranberries half a crop.

Huntington (H. W. STICKNEY).—Corn is better than an average crop in this town. Rowen and fall feed are fully as good as usual. About the usual amount of fall seeding has been done. The yield of potatoes is more than average and the quality fine. The prospect is good for celery, root crops and other late market-garden crops. Apples, pears, peaches and plums not half crops; grapes a good yield of fine quality.

HAMPDEN COUNTY.

Chester (P. M. ADZIMA).—Indian corn is a good average crop. Rowen and fall feed are not up to the usual average in condition. Less than the usual amount of fall seeding has been done on account of dry weather. Onions are about an average crop. Potatoes are good in yield and quality. There is a fair crop of all kinds of fruit.

Blandford (E. W. BOISE).—Indian corn is fully 5 per cent above an average crop. There is hardly any rowen to be cut, and pastures are very bare and dry. Potatoes are the largest crop in years and the tubers are very large and of fine quality. Root crops, celery and other late market-garden crops do not promise more than three-fourths crops at present, though the rain of this date may improve them. Pears, plums and cranberries are good crops; apples about half a crop, but are fair and hang well on the trees.

Tolland (E. M. MOORE).—Indian corn is a full average crop. Rowen and fall feed are not up to the average except on rich, moist land. Fall seeding is not in very good condition from lack of rain. Potatoes are a good average crop and of fine quality. Root crops will be about average. Apples, pears, peaches and plums are about half crops; grapes and cranberries above the average.

Russell (E. D. PARKS).—Corn is as good a crop as is commonly harvested. Both rowen and fall feed are very poor, owing to dry weather. Not as much fall seeding as common has been done. Potatoes have been a very good crop. The prospect is fair for root crops, celery and late market-garden crops. The fruit crop is not very good as a whole. Potatoes are selling at from 40 to 50 cents a bushel.

West Springfield (N. T. SMITH).—Indian corn is a full average crop. There is but little rowen except on a few low fields, and fall feed is unusually poor. It has been too dry to plough and less than the usual amount of fall seeding has been done, and what has been sown has grown very slowly, if at all. The acreage of onions is much decreased, owing to difficulty in securing a good stand in the spring, but where this was had the crop is above the average. Potatoes are a good crop, with tubers large and smooth and of good quality. Root crops are promising, with the exception of turnips. There is a large acreage of celery, which is suffering somewhat from rust. Apples are a very

light crop, with exceptional cases of heavily loaded trees. Pears light; no peaches; few plums; grapes abundant.

Longmeadow (W. F. EMERSON).—Indian corn is a good average crop. The early rowen crop was good; later rowen and fall feed affected by drought. The fall seeding done very early is in fine shape. Onions are better than an average crop. Celery is looking well; cabbages badly eaten by worms. Apples are a fine crop; few pears; no peaches; very few plums; some grapes.

Wilbraham (F. E. CLARK).—Indian corn is a full average crop. Rowen and fall feed are both below the average. Fully the usual amount of fall seeding has been done, but the late severe drought has seriously affected many fields. Potatoes made about an average yield, mostly of large tubers of excellent quality. Turnips are fairly good, and celery very poor. Apples are dropping badly and are about 40 per cent of a normal crop; no peaches; few pears or grapes.

Ludlow (C. B. BENNETT).—Corn is just about an average crop. There is very little rowen, and no fall feed. Quite a large amount of fall seeding has been put in, but hardly any of it has come up. There is a fair crop of potatoes, but much scab. Celery promises a fair crop; turnips and cabbages light. There will not be one-fourth of a crop of fruit of any kind.

Palmer (O. P. ALLEN).—Indian corn compares favorably with former years. Rowen and fall feed are up to the usual average. The usual amount of fall seeding has been done and it is now in good condition. Onions compare well with previous years, but are not much grown. Potatoes give a larger yield of better quality than usual. The prospect for root crops and late market-garden crops is very good; celery little raised. Fruit promises very poorly as a rule.

Brimfield (GEO. M. HITCHCOCK).—Indian corn is much above an average crop. Rowen and fall feed are below average, owing to dry weather. Not much fall seeding has been done and that put in is suffering for want of rain. Potatoes are more than an average crop of good quality. Root crops, celery and other late market-garden crops are but little raised. There are but very few apples and no other fruit.

Wales (C. F. CRAWFORD).—Indian corn is better than an average crop. Rowen and fall feed are very light. No fall seeding has been done as yet. Onions are about an average crop. Potatoes made a very heavy yield, but they are scabby and worm-eaten. Root crops, celery and late market-garden crops are about average, but are not much raised. Apples are scarce; pears and plums rather light; no peaches; grapes very plenty.

WORCESTER COUNTY.

Warren (WM. E. PATRICK).—Indian corn is an average crop. Rowen is about a three-fourths crop, and fall feed is short. Less than the usual amount of fall seeding has been done, but that which is in is in fine condition. Onions are more than an average crop. Potatoes are an average crop in yield and quality. There will be a fair yield of late market-garden crops. Apples are very scarce and of poor quality; grapes a large crop; few pears; no peaches or plums.

Brookfield (F. E. PROUTY). — Indian corn is about an average crop, but not as good as last year. Rowen and fall feed are not quite up to the usual average. About the usual amount of fall seeding has been done, but the dry weather has injured it. Potatoes are more than an average crop. Root crops, celery and late market-garden crops promise well. There will be a light crop of all kinds of fruit. The drought has shortened all crops not previously matured.

New Braintree (C. D. SAGE). — Corn is about a fair average crop, but rather late. There is very little rowen to help out the short hay crop; should the winter be a hard one there will be a brisk demand for hay before spring. Fall feed is not as good as usual. Stock have done well for a dry season. Very little fall seeding has been done as yet. Potatoes are more than an average crop and are sound and of good quality. Apples are 25 per cent of a crop; pears 75 per cent; no peaches; no plums; grapes 100 per cent; cranberries 50 per cent.

Rutland (L. S. DUDLEY). — Corn is about an average crop. Rowen and fall feed are much below the usual average of condition. Not as much fall seeding as usual has been done and that put in is now very backward. Potatoes are an average crop in yield and quality. The prospect is good for root crops, celery and other late market-garden crops. Apples, pears and peaches poor; plums, grapes and cranberries good.

Petersham (S. B. COOK). — Indian corn is fully up to the average of other years. Rowen and fall feed are in good condition. A little less fall seeding than usual has been done, but that put in appears to be in good condition. Potatoes are 25 per cent above the average in yield and of good quality. The prospect is good for root crops, celery and other late market-garden crops. Apples half a crop; pears 40 per cent; grapes a full crop; no peaches or plums.

Templeton (LUCIEN GOVE). — Indian corn is a fair average crop, though the ears are rather short, and frost did the crop some damage. Rowen is very light, and pastures are not in good condition for the winter. Less than the usual amount of fall seeding has been done and it is not in good condition. Potatoes are rather below an average crop, but the quality is fine. Root crops are below normal; celery not raised; late cabbage not promising, because of drought and worms. Apples are a very light crop; pears medium; no peaches; plums light; grapes good. We have had a condition of semi-drought all through the season. Peas were nearly a failure and beans rusted badly. Early cabbages did well and squashes made a fair crop.

Hubbardston (C. C. COLBY). — Corn is fully up to an average crop. A very light crop of rowen will be cut, and pasturage is unusually poor. The potato crop is the largest for years and of excellent quality. Root crops in general are looking well and will give large yields. There are very few apples; pears, grapes and cranberries in abundance. A hard frost about the 15th did considerable damage.

Fitchburg (JABEZ FISHER). — Rowen and fall feed are fully 75 per cent below the usual average of condition. Winter apples will give 25 per cent of a full crop, pears 60 per cent and grapes 100 per cent.

Fruits in general have developed an unusual amount of sugar and flavor, and are fully a week earlier in ripening than the average for forty years. Specimens are also unusually large and fair.

Princeton (A. O. TYLER).—Indian corn is about a good fair crop. Rowen and fall feed are below the usual average. The usual amount of fall seeding has been done and is in fairly good condition. Potatoes are an average crop in yield and quality. The prospect is fair for root crops, celery and other late market-garden crops. Apples poor; pears good; peaches scarce; plums good; grapes good; and cranberries good.

Harvard (J. S. PRESTON).—Corn compares very favorably with an average crop. Rowen and fall feed are very far short of an average crop. The usual amount of fall seeding has been done, but it is off in condition though the recent rains have given it a start. Onions are little raised, but are a good crop. Potatoes are few in a hill, but of good size, making an average crop or more. Root crops, celery and other late market-garden crops look very well. Apples are very scarce; pears an average crop; no peaches; few plums; grapes fair; cranberries very good.

Lancaster (S. C. DAMON).—Indian corn compares well with an average crop. Rowen and fall feed are not up to the usual average. It has been very dry and new seeded pieces are backward. Onions are a good crop, but not much grown. Potatoes give more than the average yield and are of good quality. Root crops are fair; and late market-garden crops look well. Apples not over 5 per cent of a crop; pears good; no peaches; grapes above average; cranberries good.

Holden (GEO. S. GRAHAM).—Corn is a good average crop. There is no rowen, and very little fall feed. Hardly as much fall seeding as usual has been done and it is very small, owing to the drought. Potatoes made an average yield of splendid quality. There are very few peaches or plums; grapes and pears plenty; winter apples about a one-third crop.

Worcester (S. A. BURGESS).—Indian corn is a good average crop. Rowen and fall feed are 20 per cent off in condition. The usual amount of fall seeding has been done and it is in fairly good condition. Onions are 80 per cent of a full crop. Potatoes are an average crop in yield and quality. The prospect is fairly good for root crops, celery and other late market-garden crops. Fruit will yield pretty well as a whole; pears and peaches have not amounted to much, but grapes are abundant. The late rains have helped fall seeding and pastures.

Shrewsbury (T. F. MARSTON).—Indian corn is a good crop, but not much of it has been cut as yet. Rowen and fall feed are not up to the usual average. Not much fall seeding has been done. Onions did not come up very well, but are of good size. Potatoes are an average crop in yield and quality. Root crops, celery and other late market-garden crops are not up to the average. Apples scarce; pears about half a crop; no peaches; not many plums or cranberries grown.

Westborough (B. W. HERO).—Corn is about three-fourths of an average crop. The rowen crop is almost a failure. Fall feed is below the

average, but has improved since the recent rains. But little fall seeding has been done. Onions are a good average crop. The prospect is that root crops, celery and other late market-garden crops will be below the average. Very few apples; peaches a failure; about an average crop of pears, plums, grapes and cranberries.

Millbury (C. H. STOCKWELL).—Indian corn is a very good crop. Fall feed is not up to the usual average in condition, and very little rowen will be cut. The usual amount of fall seeding has been done and it is doing very well. Onions are an average crop. Potatoes are an average crop in yield and quality. Root crops are good. Apples, pears, grapes and cranberries will give partial crops; no peaches or plums. Ensilage corn made a very large growth.

Douglas (J. M. RAWSON).—Indian corn has eared out finely and is above the average. Rowen and fall feed are not up to the usual average. About the usual amount of fall seeding has been done, but it is too dry to determine its condition. Onions are about an average crop, but are not largely planted. Potatoes are more than an average crop of excellent quality, though white grubs have worked badly in some fields. The prospect for root crops is fairly good, but it has been too dry for celery and other late market-garden crops. Apples few; pears fair; no peaches; plums good; grapes medium; and cranberries good.

Blackstone (O. F. FULLER).—Indian corn is not quite up to an average crop. There is only about a one-third crop of rowen, and fall feed is very short. The usual amount of fall seeding has been done. A good yield of potatoes is reported and the quality is good. The prospect for root crops is good, and late market-garden crops look finely. There are very few apples and pears; no peaches; few plums; a good yield of grapes; and the largest yield of cranberries for five years.

MIDDLESEX COUNTY.

Hopkinton (W. V. THOMPSON).—Indian corn is about an average crop. There is no rowen, and fall feed is very light. Less than the usual amount of fall seeding has been done and it has been too dry for it to be in good condition. Potatoes are an average crop of good quality. The prospect is poor for root crops, celery and other late market-garden crops. There are no apples; few pears; no peaches; and no plums; but grapes are a good crop and cranberries a light one.

Marlborough (E. D. HOWE).—Indian corn is about 90 per cent of a full crop. Rowen and fall feed are decidedly not up to the usual average. No fall seeding has been done as yet, but the rains of the 20th will improve the condition and seeding will be done. Onions are an average crop for quantity and extra for quality. Apples are very uneven; pears 80 per cent of a full crop; peaches 10 per cent; plums 10 per cent; grapes 100 per cent.

Sudbury (E. W. GOODNOW).—Indian corn will be above a normal crop. Rowen and fall feed are not up to the usual average of condition. A great deal of fall seeding has been done, but owing to the dry season it is not looking well. The onion crop is about normal in this section.

Potatoes are about an average crop, but the quality is extra good. Root crops, celery and other late market-garden crops are looking exceedingly well. There is a good crop of pears, grapes and cranberries, but apples and peaches are scarce.

Maynard (L. H. MAYNARD).—Indian corn is below the average in quantity and quality. The recent heavy rains have had a marked beneficial effect on rowen and fall feed. The usual amount of fall seeding has been done, and though early sown fields have suffered somewhat the present condition appears to be good. Onions never were a better crop; yield enormous and quality superior. Potatoes made an average yield, but white grubs have damaged them considerably. The prospect for root crops is excellent, with the exception of turnips. Apples are a short crop; also pears, peaches and plums; grapes and cranberries plenty.

Stow (G. W. BRADLEY).—Corn is about a two-thirds crop. Rowen and fall feed are very near a failure in this vicinity. Owing to drought there has not been very much fall seeding so far. Onions are about an average crop. Potatoes are a full average crop of good quality. Root crops, celery and other late market-garden crops are but little raised, and have suffered from drought. Apples are small and wormy; pears a light crop, but very good; peaches and plums a failure; grapes quite plenty and very good; cranberries damaged by frost. There will be a large crop of squashes.

Townsend (G. A. WILDER).—Indian corn is more than an average crop. Rowen and fall feed are up to the usual average. The usual amount of fall seeding has been done and it is in good condition. Onions are less than an average crop. Potatoes are a very good crop, with no sign of rot. Root crops, celery and other late market-garden crops promise about the same as usual. Apples poor; pears less than average; no peaches; plums average; grapes good; cranberries good.

Pepperell (P. J. KEMP).—Indian corn is about an average crop. Rowen is a very light crop. Fully the usual amount of fall seeding has been done and it looks fairly well, considering the dry weather. Onions are more than an average crop. The prospect is for more than average crops of roots, celery and other late market-garden crops. There are no apples, pears or peaches; and very few grapes and plums.

Lowell (C. L. MARSHALL).—Indian corn is an average crop and is better than last year. Rowen and fall feed are below average on account of drought. The usual amount of fall seeding has been done, but it is in poor condition. Onions are a comparatively good crop. Potatoes are below the average in yield, but the quality is the very best. Most late market-garden crops are good, but vines have been destroyed by blight. No apples to speak of; pears good; no peaches; grapes a fair yield; cranberries poor.

Tewksbury (G. E. CROSBY).—Corn is 20 per cent off from an average crop. Rowen and fall feed are not up to the usual average. The usual amount of fall seeding has been done, but it is not looking as well as usual, owing to dry weather. Onions are a good crop. Potatoes are off in yield, but of good quality. The prospect for root crops, celery and

other late market-garden crops is very good. There are few apples and pears; no peaches; few plums and grapes; cranberries fair in yield and quality.

Billerica (J. N. PARDEE).—Corn is considerably below the average. On low, rich ground the rowen crop is fair, but on high, dry ground there is none. Not much fall seeding has been done. Potatoes are about half a crop, but the quality is excellent. Apples are very scarce and very poor; pears scarce; no peaches; grapes good. The drought has extended through the season and wells have been drying up.

Burlington (C. E. MARION).—Rowen is light, and fall feed is very short. There has been no fall seeding done as yet. The onion crop is an average one. Early potatoes have done well, but late ones are light. The prospect for roots is good, but celery is blighted; other late market-garden crops are looking fairly well. Apples are very light; pears light; no peaches; plums a good crop; cranberries a large crop. Late crops, such as carrots, parsnips, beets and turnips, are looking well. Hubbard squashes have made a fine yield.

Wakefield (CHAS. TALBOT).—Small acreage of Indian corn planted, yield small, but of good quality. Rowen and fall feed are not more than two-thirds as good as usual. The usual amount of fall seeding has been done and it is looking well. Onions are a large crop of fine quality. Potatoes were never better as to yield and quality. Celery is looking finely and doing well; beets fine; turnips fair; carrots a good crop. No apples; few pears; peaches and plums a failure; grapes a two-thirds crop; cranberries small but looking well.

Lincoln (SAMUEL HARTWELL).—Indian corn is not much grown, but is a fair crop. Rowen and fall feed are not up to the average as a rule. The usual amount of fall seeding has been done, but it is in very poor condition, the seed having failed to germinate because of dry weather. Onions are an average crop. Potatoes are an average crop in both yield and quality. Root crops, celery and other late market-garden crops do not promise very well. Pears and grapes have done well, and other fruits poorly.

ESSEX COUNTY.

Salisbury (WESLEY PETTENGILL).—Indian corn is a good crop. Rowen is not up to the average and not over one-fourth of last year's crop. On account of drought very little fall seeding has been done. Onions are more than an average crop. Potatoes are a good average crop, a little light on high ground, extra on low ground. Root crops are fair; celery not much raised; cabbage looking poorly. Apples are looking better than a month ago, but the crop will be light; pears fair; peaches very light; plums fair; grapes extra good.

Amesbury (F. W. SARGENT).—Indian corn is about an average crop, and ensilage corn made a remarkable growth. Rowen and fall feed are far below the average, because of drought and grasshoppers. The usual amount of fall seeding has been done, but little seed has started as yet. Onions have done extra well and are 20 per cent above the average. Potatoes are not quite up to the average; the tubers are

large, but few in the hill. Root crops fair; celery below the average; cabbages below average and badly damaged by grasshoppers. Fruit is very short, with the exception of grapes.

Andover (M. H. GOULD).—Corn is not up to an average crop. Rowen and fall feed are not up to the usual average. About the usual amount of fall seeding has been done, but the condition is poor on account of dry weather. Onions are not up to an average crop. Potatoes are off in yield, but of good quality. The prospect for root crops, celery and other late market-garden crops is not good. There will be a good crop of cranberries; other fruit light.

West Newbury (J. C. TARLETON).—Indian corn is far ahead of an average crop. Rowen and fall feed are not up to the usual average. Fall seeding has been done to some extent and is looking very well. There is no crop of onions here whatever, they all having been ploughed in in June. Potatoes give an average yield of good quality. Crops of celery are few, but good; other late market-garden crops are not up to the common yield. We have very few apples, peaches or cranberries, but a great amount of the other fruits mentioned.

Topsfield (B. P. PIKE).—Indian corn is nearly an average crop. There is no rowen to speak of, and fall feed is very light. Less than the usual amount of fall seeding has been done and it is in very poor condition. Onions are a very good crop. Potatoes are a very good crop, especially on light land. Turnips and cabbages are very poor crops. Apples are 10 per cent of a full crop; no peaches; pears fair; grapes good; cranberries poor.

Manchester (JOHN BAKER).—Indian corn is a good average crop. Rowen and fall feed are in very poor condition. It has been a little too dry for fall seeding, but the recent rains will improve it. Onions are about an average crop. Potatoes are an average crop in yield and quality. The prospect is not extra good for root crops, celery and other late market-garden crops. Apples, plums and pears are fair crops; cranberries scarce, but very large and fair.

NORFOLK COUNTY.

Franklin (C. M. ALLEN).—Indian corn is 90 per cent of an average crop. Rowen and fall feed are fully 50 per cent off in condition. Less than the usual amount of fall seeding has been done and it looks poorly, and much of the seed failed to germinate. Potatoes were an average crop of good quality. The prospect for root crops, celery and other late market-garden crops is 25 per cent off. Apples very few; pears inferior; no peaches; few plums; grapes good; cranberries medium.

Millis (E. F. RICHARDSON).—Indian corn is a good crop. Rowen and fall feed are far below the average in condition. Less than the usual amount of fall seeding has been done and that in has made barely any growth. Onions are a good average crop. Potatoes are above an average crop of large size and excellent quality. The prospect is rather poor for root crops, celery and other late market-garden crops. There is a very poor crop of all kinds of fruit.

Norfolk (GEO. E. HOLBROOK).—The weather has been so dry that corn has not filled out well and is below average. Rowen is not half a crop. More than the usual amount of fall seeding has been done, but it is very backward on account of dry weather. Potatoes are the best crop for many years in both yield and quality. The prospect is poor for root crops, celery and other late market-garden crops. Grapes and cranberries are very good; other fruits light.

Sharon (E. E. NARAMORE).—Indian corn is about three-fourths of an average crop. Rowen and fall feed are considerably below the usual average. Fall seeding has done well on low, moist land. Potatoes are not yielding quite up to the average, but the quality is good. The prospect for root crops is good, also for late market-garden crops. Apples a poor crop; pears a little better, but short; grapes and cranberries good.

Canton (E. V. KINSLEY).—Indian corn is about an average crop, though the ears have not filled out quite as well as usual. Rowen and fall feed are almost a failure. Almost no fall seeding has been done, and no seed put in has germinated. Onions are less than an average crop, being poorly stocked. Potatoes are about average in yield, tubers very large and quality A1. Cabbages and winter turnips may be average crops; other late market-garden crops light. Winter apples very poor; grapes good; cranberries badly damaged by frost; other fruits light. Much grass land is damaged by white grubs.

Avon (S. F. OLIVER).—Corn is not quite up to an average crop. Rowen on high land is nearly a complete failure, but the low lands will do as well if not better than usual. Very little fall seeding has been done, but early fields are showing up well. Potatoes are a fair crop, but not up to the standard, and in some cases rot is apparent. Celery was never better than this year. Pears are abundant; apples, though not so plenty, are of good quality; cranberries will be a total loss.

Randolph (R. A. THAYER).—Indian corn is about an average crop. Rowen and fall feed are not up to the usual average. Not as much fall seeding as usual has been done, with a poor catch, except on moist land. Onions are a good average crop. Potatoes gave a good fair yield of excellent quality. Most late market-garden crops will give only a medium yield. Apples are a one-third crop; pears good; peaches none; grapes good; cranberries good. The drought has done serious injury to barley, millet and all late-sown fodder crops.

BRISTOL COUNTY.

Mansfield (WM. C. WINTER).—Indian corn is an average crop. Rowen and fall feed are very much below the usual average. The weather has been so dry that little or no fall seeding has been done. Very few onions are raised, but they have been an average crop. Potatoes are an average crop of excellent quality. Root crops, celery and other late market-garden crops are below the average in yield and of inferior quality. Apples are a light crop; pears fair; peaches very light; Japan plums good, native very light; grapes above average; cranberries fair.

Attleborough (ISAAC ALGER).—Corn is a full average crop. There is no rowen, but fall feed is fair. The usual amount of fall seeding has been done and it is in good condition. Potatoes are an average crop in yield and quality. There are no apples; grapes and cranberries fair, though cranberries have suffered considerably from frost and water.

Seekonk (F. A. HOWE).—Indian corn compares favorably with an average crop. Rowen and fall feed are not up to the usual average. Owing to the dry weather fall seeding is late, but about the usual amount has been done. Onions are a rather better crop than usual. Potatoes are an average crop in yield and quality. Celery is looking well, but root crops were hurt by dry weather. The fruit crop was the best in years.

Dighton (J. N. PAUL).—Indian corn compares well with an average crop. Rowen and fall feed are not up to the usual average. Less than the usual amount of fall seeding has been done and it is not in good condition. Onions have made an extra large yield. Potatoes are an average crop in quantity and quality. Root crops will be good; celery very good; other late market-garden crops good, except cabbage. Apples good; pears poor; peaches, plums and grapes good.

Westport (A. S. SHERMAN).—Corn is a fine crop, better than the average. Rowen and fall feed are not up to the usual average. Less than the usual amount of fall seeding has been done on account of dry weather. Onions are a good crop of large size. Potatoes are not average in yield, but of good quality. Turnips and cabbages are doing well; celery little raised. Apples and pears plenty; peaches and plums scarce; grapes abundant; cranberries not up to the average.

Dartmouth (L. T. DAVIS).—I should say that corn was a fair average crop. Rowen and fall feed are far below the usual average of condition. Hardly as much fall seeding as usual has been done as yet it having been too dry up to the present time. Onions are a fair average crop. Potatoes show good yield and quality where they have not rotted. The prospect is rather poor for most of the later market-garden crops, unless the rest of the season is unusually warm. Apples are 40 per cent of a full crop; pears 60 per cent; plums 75 per cent; grapes 100 per cent; cranberries 85 per cent; no peaches.

PLYMOUTH COUNTY.

Brockton (DAVIS COPELAND).—Indian corn is a full crop. Rowen and fall feed are good on moist land, but short elsewhere. The usual amount of fall seeding has been done, but owing to the dry weather it has not started well. Onions are about a full crop. Potatoes are an average crop in yield and quality. Dry weather has kept root crops, celery and other late market-garden crops back, but the recent rains have helped them. Apples and peaches have been short crops; other fruits about average.

Hanover (H. L. HOUSE).—Indian corn is a rather short crop on account of dry weather. Rowen and fall feed are rather short on account of continued dry weather. About the usual amount of fall seed-

ing has been done and its present condition is good. Very few onions are raised here. Potatoes are much above the average both in quantity and quality. Root crops promise to be about average, but late market-garden crops will probably be rather below. Apples very few and poor; pears plenty and good; no peaches; grapes good; cranberries much above average.

West Bridgewater (C. P. HOWARD).—Corn is fully an average crop. Rowen and fall feed are about a third off in condition. The usual amount of fall seeding has been done and it is growing well. Onions are but little raised, but have done well. The acreage of potatoes was large and the crop is above average. A good crop is expected of roots, celery and other late market-garden crops. Pears are plenty; peaches and plums not generally raised for market; grapes ripened well; cranberries a good crop.

Halfax (G. W. HAYWARD).—Indian corn is a fair average crop. The rowen crop is very light. Owing to dry weather we have done no fall seeding until now and there is none up as yet. The onion crop is fully up to the average. Potatoes have been one of the finest crops ever raised, both in quality and quantity. The prospect for root crops is poor. There are some apples, but other fruits are scarce.

Marshfield (J. H. BOURNE).—Corn is not fully filled out, owing to the recent drought. Rowen and fall feed are not up to the usual average. Onions are less than an average crop, owing to drought. Potatoes are a good crop of good-sized tubers. Root crops will be light; celery little raised. More apples than last year; pears and peaches nearly the same; plums and grapes more than average; cranberries are yielding well and have ripened earlier than usual.

Kingston (G. L. CHURCHILL).—Indian corn is not as good a crop as formerly. Rowen and fall feed are up to the usual average. Such fall seeding as has been done is in good condition. Onions are a fair crop. Potatoes are up to the average in yield and quality. The prospect for root crops, celery and other late market-garden crops is very fair. Fruits have done quite well in this section, and there is more than an average crop of cranberries.

Carver (J. A. VAUGHAN).—Corn is an average crop. Rowen and fall feed are not up to the usual average. Less than the usual amount of fall seeding has been done up to the present time. Onions are an average crop. The prospect is good for root crops, celery and other late market-garden crops. There is an average crop of apples and pears of good fruit, but no peaches. The cranberry crop is a little larger than last year. Owing to the clear, fine weather they are being harvested in fine condition; prices low.

BARNSTABLE COUNTY.

Falmouth (D. R. WICKS).—Indian corn is a good average crop. Not much rowen, owing to drought, but fall feed is fair. Most of the fall seeding is already done. Onions will be less than an average crop because of drought. Potatoes are average in quality, but not in yield,

being perhaps half a crop. Root crops promise poorly, but are little grown. All fruits, including cranberries, have turned out well.

Sandwich (J. R. HOLWAY).—Indian corn is about a three-fourths crop. Rowen and fall feed are up to the usual average. Less than the usual amount of fall seeding has been done because of dry weather. Onions are a good crop. Potatoes are an average crop in yield and quality. Apples, pears, peaches and grapes are good crops. There are good yields of cranberries on some bogs, and on others none at all; should say there was an average crop.

Mashpee (W. F. HAMMOND).—There will be about an average crop of Indian corn. Rowen and fall feed are about up to the average. Less than the usual amount of fall seeding has been done thus far. There is an average crop of onions. Potatoes are an average crop of good quality. Roots and late market-garden crops are looking well. Apples, peaches and grapes are one-half crops; pears a full crop; no plums; cranberries a full crop.

Barnstable (JOHN BURSLEY).—Corn is a little more than an average crop. Rowen and fall feed are not up to the usual average. Less than the usual amount of fall seeding has been done. Potatoes are an average crop in yield and superior in quality. Turnips have suffered for rain; no other market-garden crops grown. Apples, pears and cranberries give large crops; other fruits light. Cranberries are three-fourths harvested, without any damage from frost.

Dennis (JOSHUA CROWELL).—Corn is a full average crop. Rowen and fall feed are not up to the usual average. Not much fall seeding has been done. Onions are more than an average crop. Potatoes are off in yield and quality. Root crops promise to be good. Apples and pears are full crops; grapes a large crop; cranberries about average. The latter part of the season has been too dry for most crops.

Wellfleet (E. S. JACOBS).—Rowen and fall feed are about up to the usual average. The usual amount of fall seeding has been done and is looking well. But few onions are raised and the crop is about average. Potatoes are above the average in yield and quality. The prospect is good for root crops. Apples are abundant, as every tree, old or young, seems to be full of fruit of good quality.

NANTUCKET COUNTY.

Nantucket (C. W. GARDNER).—Indian corn is about an average crop. Very little rowen will be cut. There has been no fall seeding on account of dry weather. The onion crop is not up to the average, owing to injury from maggots. The prospect is very good for root crops, celery and other late market-garden crops. Cranberries have been injured by frost.

BULLETIN OF MASSACHUSETTS BOARD OF AGRICULTURE.

BIRDS AS DESTROYERS OF HAIRY CATERPILLARS.

By E. H. FORBUSH, *Ornithologist to the Board.*

One spring day, long years ago, a vireo sang in a sunny, swampy thicket. Suddenly the bird ceased its song, leaned forward, ran along the limb, picked a large caterpillar from a twig, pecked it a little, swallowed it and resumed its song.

A small boy, a witness of the act, followed the bird closely, and saw that during each intermission of the song it was occupied either in catching caterpillars or other insects on the twigs and leaves, or in pursuing flying insects through the air.

Previous to that day birds had interested the writer principally because of their beauty and song, but this incident opened a new field for study, the pursuit of which has since convinced him that birds as a class excel all other animals as destroyers of those insects which feed upon vegetation, and that the species of plant-feeding insects which escape decimation by birds, at one time or another, are very few as compared to the total number of such species in existence.

In such research as the writer has been able to make in agricultural, ornithological and entomological literature it has become noticeable that certain insects are supposed by many writers to be protected by prickly hairs or spines from the attacks of birds.

This astonishing error, for which there is really very little excuse, has been repeated, in one form or another, by writer after writer during the present century, and is still persisted in. No less an authority than the late Prof. C. V. Riley, for many years entomologist to the United States Department of Agriculture, has assisted in the promulgation of this belief. The most positive statements have been made to the effect that birds do not eat hairy caterpillars, although here and there an exception to the rule is named. Among the earliest of these statements now at hand is one from a writer in the "*Annales de l'Institut Horticole de Fromont*," vol. 5, p. 311, published in Paris in 1833.

In discussing the opinion promulgated by the Natural History Society of Gorlitz, that the diminution of fruits is on account of the diminution of birds, he places the caterpillar of the gypsy moth at the head of the list of injurious caterpillars, saying, "that above all it is very essential that it be destroyed." He says further that as these caterpillars are armed with long hairs the birds guard well against bringing them to their young and that in twenty years of observation he has not seen a single example. He also states that these insects when in the chrysalis are not sought by birds.

Statements like the above have been received without question, and the inferences and conclusions drawn by the earlier writers appear to have been accepted and promulgated by others. In recent years, however, more accurate knowledge seems to have been gained by a few

observers at home and abroad in regard to this matter. The ornithologists of our national Department of Agriculture have added much to our knowledge of the subject.

The purpose of the present article is to furnish conclusive evidence that the hairs with which some caterpillars are armed are not a sufficient protection to guard them from the attacks of birds, many of which eat quantities of them and some also feed them to their young. It is also intended to show that many birds feed upon these insects later in the chrysalis or in the imago.

Those species of birds which feed upon hairy caterpillars are among the best friends of the farmer and horticulturist, in so far as they prove destructive to these insects, many of which are among the worst enemies of farmers and fruit growers.

When one attempts to disprove a theory which has been widely accepted for many years his readers are naturally inclined to be skeptical as to his conclusions, and to question the accuracy of the observations on which such conclusions are based. Therefore, a brief description of the methods used and a statement of some of the results obtained will be necessary here.

During the progress of the work on the gypsy moth by the State Board of Agriculture in Massachusetts more than a thousand men have been employed, among whom there are, or have been, many who know the common birds. Some of these men are keen-eyed observers. In the early history of the work, when it was seen that birds were feeding on the gypsy moth caterpillars, all those men employed who knew birds were requested to watch the birds and report the results of their observations. There were eleven such observers on the force at that time. Others have joined the force from time to time, until the number whose experiences have been recorded has been increased to thirty-eight. Some of these observers have seen birds feeding on the caterpillars of the gypsy moth for only one season, others have been in the employ of the Board for six, seven or eight years, and have made observations during each year. The conditions have been such that most of the birds could be observed within a few feet or a few yards. Those which could not be so readily approached were watched with the aid of good field or opera glasses, and where there appeared to be doubt birds were shot and the contents of their stomachs carefully analyzed.

Much was learned by experience in the earlier observations which has been turned to good account in conducting those made during the last three years. The value of such observations may be questioned by those who rely solely upon the examination of the stomach contents to determine the food of birds. But for the purpose for which these observations are made they are, if skilfully conducted, quite as serviceable as stomach examinations. In fact, one must supplement the other.

Were one to follow the birds about through the fields and woods no doubt some interesting facts might be learned in regard to their food, but it is not in this way that a series of accurate observations can be made. Birds are attracted to localities where insects are plentiful, preferring often to go some distance to such localities, where food is abundant and readily obtained, rather than to search for less abundant species near their nesting places. For our purpose, then, the method pursued has been to find an outbreak of hairy caterpillars situated in a locality where many species of birds would be likely to find it. The observer first makes sure as to the kind of insects to be found upon the trees or plants to be watched. He then conceals himself near the insects whose destruction he wishes to observe and watches the birds which come there to feed.

When this method is followed methodically by trustworthy, painstaking observers, and when results obtained by different observers, working independently, agree in the main, there can be no reasonable doubt as to the value of such observations. When the caterpillars are

small certain marked branches are chosen for observation, or certain nests, webs or tents are marked and watched at close range. One observer has even counted the number of caterpillars on a branch, watched the birds feed upon them and then counted the number left alive.

The results of the earlier observations were published in the report on the gypsy moth, issued by the State Board of Agriculture in 1896.*

It was then proved conclusively that thirty-eight species of birds were destroying the gypsy moth in one or more of its forms, and thirty-one of these were feeding on the caterpillars. Since that time several birds have been added to the list, and much more has been learned as to the comparative usefulness in this respect of several species.

The discovery of another introduced pest, the brown-tail moth, *Euproctis chrysorrhæa*, in Massachusetts in 1897, has stimulated further observation, and incidentally the feeding of birds on other hairy caterpillars has been noticed.

It is not the intention of the writer now to republish the result of the observations given in the report on the gypsy moth in 1896, but to place before the reader some facts observed that year and since. From the mass of observations on the food of birds a part has been selected of those which refer to the two introduced European species—the gypsy moth, *Porthetria dispar*, the brown-tail moth, *Euproctis chrysorrhæa*—and two common American pests—the tent caterpillar, *Chlosiocalpa americana*, and the forest tent caterpillar, *C. sylvatica*. In these four species we have typical examples of genera, the larvæ of which have been considered especially distasteful to birds on account of the hairs with which they are covered. The caterpillars of the brown-tail moth would appear to be a particularly disagreeable morsel to swallow. They are not only furnished with long, bristly hairs, but the hinder segments of the body are also supplied with minute, shorter hairs which are barbed, somewhat like the quills of the porcupine. These hairs produce very disagreeable consequences when brought in contact with the human skin, into which they work their way and there become the source of a serious and long-continued irritation.† Many people in the district infested by the brown-tail moth have been seriously inconvenienced by this cause and the services of physicians in the region infested have been widely sought for a remedy. The irritation resembles that caused by poison ivy and no infallible cure has yet been found. One would think that a bird which had inadvertently swallowed one of these creatures would not care to repeat the experiment, but the observations of Mr. F. H. Mosher, a very careful observer, show that as many species of birds feed on the brown-tail caterpillar as upon the gypsy caterpillar, and some species eat quantities of the former.

Some of the hairs of the gypsy caterpillar possess an irritating property, so that the sensation produced by them, when pressed against any tender portion of the human skin, is similar to that produced by nettles.

The hairs on the tent caterpillar do not seem to possess either of these properties. But even these larvæ do not appear a tempting morsel, thickly covered as they are with long hairs.

The forest tent caterpillar also is supplied with hairs sufficient to secure it immunity from the attacks of birds if, indeed, such hairs constitute any protection whatever.

THE NUMBER OF HAIRY CATERPILLARS DESTROYED BY BIRDS.

In order to get a definite idea of the comparative usefulness of the different species of birds in destroying hairy caterpillars, I have asked Mr. Mosher to count the number of caterpillars each bird was actually seen to eat during the time occupied in some of its visits to trees infested by caterpillars. As examples of the capacity of birds' stomachs for this

* "The Gypsy Moth," Forbush-Fernald, 1896.

† Proc. 10th Ann. Meeting Assn. of Ec. Ents., Bul. 17, p. 27, Prof. C. H. Fernald.

kind of food a few of his notes are given in brief below. In most cases it was impossible to count all the caterpillars eaten by a bird during its visit, for it was likely to be partially hidden from the observer a part of the time by twigs or leaves. The results given show only the number of caterpillars each bird was actually seen to eat. The observer in many instances notes that the bird must have eaten many more, as it was almost continually eating during its visit.

To prepare the reader for the somewhat startling facts which follow it is necessary to consider some of the physiological characteristics of the bird. Birds as a class are among the most highly organized of vertebrate animals. In this class we find the extreme of activity and the highest temperature of the blood. Their remarkable activity, especially in flight, causes a tremendous waste of tissue. To supply the waste caused by this great expenditure of nervous energy a large quantity of food is required. Nature has made ample provision for the digestion and assimilation of this great quantity of food, supplying the bird with a remarkably perfect digestive apparatus, the action of which is very rapid. The writer has recorded elsewhere the results of experiments with two crows, which show that the food passes through the entire digestive tract in about one and one-half hours, and it is known that digestion is much more rapid in some of the smaller insect-eating birds. The amount of food required by the crow is given by Mr. E. A. Samuels as eight ounces per day. In reading what follows one should take into consideration not only the enormous amount of food required daily by the birds, but also note the dates on which the observations were made. It would seem impossible for some of the smaller birds mentioned to stow away in their small stomachs so many caterpillars in so short a space of time. But the dates alone will indicate to those familiar with the life histories of the insects that where the greater numbers were eaten the caterpillars were quite small, and such is the fact.

The facts given below were ascertained by Messrs. Mosher and Kirkland:—

Birds Feeding on the Gypsy Moth Caterpillars.

- May 12. — A yellow warbler ate 15 caterpillars in less than 5 minutes.
- May 12. — A Nashville warbler ate 42 caterpillars in one-half hour, in the meantime taking many more.
- May 18. — A scarlet tanager ate upwards of 30 caterpillars within 5 minutes.
- May 18. — Two scarlet tanagers together ate small caterpillars at the rate of 35 a minute for 18 minutes.
- May 20. — A crow blackbird ate 40 caterpillars in a little over 3 minutes.
- May 26. — A Maryland yellow throat ate 52 caterpillars while moving in and out among trees. Time could not be taken.
- May 26. — A redstart ate 31 caterpillars while moving about. Time could not be accurately taken.
- — A red-eyed vireo ate, in four brief visits to an infested tree, 37 caterpillars.
- July 13. — A yellow-billed cuckoo ate 1 every 2 minutes for 36 minutes.
- July 13. — A red-eyed vireo ate 73 in 40 minutes.
- July 14. — A yellow-billed cuckoo ate 81 in 48 minutes.
- July 15. — A towhee ate 7 pupæ and 2 caterpillars in a very short time. Exact time not noted.

Birds Feeding on the Brown-tail Moth Caterpillars.

- May 2. — A robin pecked into a mass of caterpillars five times, taking a number each time. They could not be counted.
- May 11. — A pair of blue jays ate 47 caterpillars in 18 minutes.
- May 11. — A black-and-white warbler ate 15 caterpillars in 10 minutes.

- May 12. — A rose-breasted grosbeak ate 57 caterpillars in 20 minutes.
 May 15. — A chestnut-sided warbler ate 28 caterpillars in about 12 minutes.
 May 16. — A scarlet tanager ate 44 caterpillars in 17 minutes.
 May 19. — A redstart ate 11 caterpillars within 5 minutes.
 May 19. — Two scarlet tanagers ate, one 9 and the other 16 caterpillars in 4 minutes.
 May 22. — A pair of chickadees ate, one 15 and the other 21 caterpillars in 7 minutes.
 May 23. — A red-eyed vireo ate 43 caterpillars in 10 minutes.
 May 23. — A blue jay ate 30 caterpillars in a very brief stay. No time given.
 May 24. — A Baltimore oriole ate 34 caterpillars in 6 minutes.
 May 24. — A red-eyed vireo ate 29 caterpillars in 6 minutes.
 May 25. — A scarlet tanager ate 43 caterpillars in 12 minutes.
 May 26. — A yellow-throated vireo ate 14 caterpillars in less than 5 minutes.
 May 26. — An indigo bird ate 16 caterpillars. Time could not be accurately taken.

Birds Feeding on the Tent Caterpillars.

- May 9. — A golden-winged warbler ate 14 caterpillars very rapidly.
 May 10. — A red-winged blackbird ate 22 caterpillars in 25 minutes.
 May 10. — A Baltimore oriole ate 14 caterpillars in 6 minutes, 27 in 8 minutes and 10 in 3 minutes.
 May 10. — A robin ate 30 caterpillars in a trifle over 4 minutes.
 May 10. — A black-and-white warbler ate 12 caterpillars in a very short time and fed for 9 minutes, though not in plain view.
 May 11. — A Nashville warbler ate 8 caterpillars in 3 minutes.
 May 15. — A Baltimore oriole ate 15 caterpillars from a web in a very short time, and 9 more 20 minutes later.

Birds Feeding on the Forest Tent Caterpillars.

Although the forest tent caterpillars have appeared recently in enormous hordes in many sections of New England and some adjacent States, they have not been numerous in eastern Massachusetts, and there have been no such opportunities to observe birds feeding upon them as have been presented with the other three species. Incidentally, however, the observers have noted that birds were searching out and eating the forest tent caterpillars, not merely taking them as they came in their way, but where one was found they searched for others, and ate them as they found them, carrying some away, presumably to their young. From what has been seen there seems little doubt that all those birds which eat the other hairy caterpillars would also take those of the forest tent caterpillars if they were numerous.

Birds Feeding their Young.

During the observations made on the enemies of the gypsy moth it was noted that many birds were carrying caterpillars to their young, and birds were often seen to feed their young with caterpillars, which, in most instances, were readily taken by the young although occasionally they were rejected.

The observations made on the tent caterpillar were mainly made before there were young in the bird nests, but birds feeding on the brown-tail moth caterpillars frequently took them away.

Few detailed observations have been made as yet at the nests. The following birds have been seen carrying hairy caterpillars to their young, or feeding them, or both: black-and-white warbler, blue jay, scarlet tanager, wood thrush, chickadee, yellow-throated vireo, red-eyed vireo,

crow, catbird, black-billed cuckoo, yellow-billed cuckoo, yellow warbler and chestnut-sided warbler.

Those birds which not only eat hairy caterpillars but also feed them to their young are doubly useful, because of the enormous amount of insect food required by young birds. Our experiment shows that young crows weighing fifteen and one-half to sixteen ounces require at least ten ounces of food each day for their growth and development. Professor Treadwell fed a young robin in twelve hours forty-one per cent more than its own weight in worms. The same bird consumed nearly half its own weight of beef in a day.

Young birds must have animal food in order to grow and develop rapidly, and this food consists mainly of insects. An idea of the constant feeding required by the young may be gained from the following brief account of the work of two pairs of birds during the greater part of the day.

On June 13, 1899, Mr. Mosher watched a pair of red-eyed vireos feeding their young. There were three young about a day old in the nest. It was near the ground and the birds could be readily observed. The observer did not reach the nest until nearly 7 A.M. (when the birds had already been feeding their young probably for at least two and one-half hours) and left at 5 P.M., at which time the day's work was not finished, so that this cannot be considered a complete record of the day. Visits were made by one or the other parent,—

Between 7 and 8, 14 times.	Between 12 and 1, 9 times.
" 8 " 9, 9 "	" 1 " 2, 12 "
" 9 " 10, 12 "	" 2 " 3, 15 "
" 10 " 11, 7 "	" 3 " 4, 13 "
" 11 " 12, 16 "	" 4 " 5, 18 "

making altogether 125 visits in ten hours.

As these young birds were very small only a few insects were brought each time, and most of those brought were so small that they could not be positively identified; but caterpillars form a considerable part of the food of these birds at this season.

On June 12, 1899, Mr. Mosher watched the nest of a pair of rose-breasted grosbeaks from early morning till 5 P.M. The nest was about fifteen feet from the ground, in a slender white birch. The ground was covered with hazel nut bushes, in which he found partial concealment, but for the first half hour the old birds were so excited by his presence that the feeding of the young birds was interrupted, so that no notes were taken until 6 A.M., and none were taken after 5 P.M.

The old birds visited the nest,—

Between 6 and 7, 52 times.	Between 12 and 1, 32 times.
" 7 " 8, 47 "	" 1 " 2, 38 "
" 8 " 9, 43 "	" 2 " 3, 41 "
" 9 " 10, 30 "	" 3 " 4, 22 "
" 10 " 11, 36 "	" 4 " 5, 58 "
" 11 " 12, 27 "	

making altogether 436 visits during the portion of the day that they were watched. The food was mainly caterpillars of one kind or another, and there were only four visits made by a parent bird when but one insect was fed to the young; they usually brought three or more. Birds often carry in this way from three to eleven or twelve small caterpillars in their mouths and beaks at one time. Owing to the height of the nest above the ground it was impossible to determine accurately the species of caterpillars brought to the young. A considerable proportion of them were certainly leaf rollers from the oak trees. It seems probable, then, that these two birds must have fed their young on that day at least one thousand insects, mostly caterpillars. This certainly is a very moderate estimate of the number of insects

destroyed in one day by the family when we take into consideration the food required by the old birds. It is impossible to estimate how many of these insects were hairy caterpillars.

It will be noted that the grosbeaks made many more visits to the nest and carried much more food than the vireos. This is accounted for by the age of the young, the vireos being just from the egg and the grosbeaks being nearly ready to fly and very much larger.

Dr. C. M. Weed, in a paper entitled "The Feeding Habits of the Chipping Sparrow," published at the New Hampshire Agricultural Experiment Station, has given a very accurate record of the feeding of the young of two chipping sparrows during the entire day, beginning at 3.40 A.M. and ending at 7.49 P.M. The nest contained three young sparrows nearly fledged. His observations show that the birds feed their young during the long days of June from fifteen to sixteen hours, and that there was no long interval during the day when they were not at work. The birds visited the nest one hundred and eighty-two times. Food (mainly insects, including many caterpillars) was brought nearly every time, though some of the trips of the birds seemed to be made to furnish sand for grinding the food for the young birds.

COMPARATIVE USEFULNESS OF CERTAIN FAMILIES OF BIRDS.

In going over the lists of birds which have been seen to destroy different species of hairy and spiny caterpillars it is interesting to note that nearly the same families are represented in each list.

The Cuckoos, Cuculidæ.

It is generally acknowledged that the cuckoo is an exception to the generally accepted rule that birds do not eat hairy caterpillars. There is no question as to the value of the cuckoos in this respect, but they feed mainly on the medium-sized and larger caterpillars. The two common American species seem even to prefer hairy caterpillars to the smooth ones, and their diet of these insects sometimes results in their stomachs becoming lined with the prickly hairs, which become embedded in the stomach coating. This, however, does not appear to inconvenience the birds. Whether there is any other family that is as useful in this respect as the cuckoos is still an open question. Our observations show that great numbers are eaten by other birds.

The Woodpeckers, Picidæ.

Woodpeckers certainly do not destroy as many hairy caterpillars as the cuckoos. They appear to take them only when they come in their way. They have been observed to maim and kill without eating.

The Flycatchers, Tyrannidæ.

The flycatchers eat very few hairy caterpillars but destroy a great many of the imagoes of the diurnal species, two kingbirds having been observed to kill about two hundred and fifty male moths of the *Porthetria dispar* in less than three hours, and many female moths as well. Many flying moths are destroyed by the flycatchers.

The Crows, Jays, etc., Corvidæ.

This family is represented by the blue jay and crow, both species being among the most useful in the destruction of medium-sized and full-grown hairy caterpillars. The observations on these birds made within the last three years prove them to be more useful in this respect than was even suspected. They are continually feeding where outbreaks of hairy caterpillars occur, eating both the caterpillars and pupæ, and feed-

ing them to their young. These birds, because of their size and voracity, destroy enormous numbers of these larvæ. It is a question whether the crows do not destroy many more than the cuckoos, because of their larger size and greater numbers. Crows destroy fully as many pupæ as larvæ.

The Orioles, Icteridæ.

The Baltimore oriole and crow blackbird are exceedingly useful. As the feeding habits of these birds have become better known their usefulness as feeders on hairy caterpillars has been recognized. They eat mainly the medium-sized and larger larvæ.

The Finch and Sparrow Family, Fringillidæ.

The finch and sparrow family is represented in Massachusetts by many species, several of which do not appear in the list of those attacking hairy caterpillars, but probably most sparrows eat such caterpillars to some extent. The chipping sparrow, song sparrow, towhee and rose-breasted grosbeak feed persistently upon them. Several observers have seen the indigo bunting attacking them. The sparrows eat both large and small caterpillars.

The Tanagers, Tanagridæ.

The tanagers are potent enemies of the hairy caterpillars wherever they appear in numbers in the woods, feeding quite constantly upon them. Our later observations indicate that no bird is more useful in woodlands.

The Vireos, Vireonidæ.

The vireos or warbling flycatchers are persistent caterpillar hunters and destroy many of these creatures. They do not feed so readily on the full-grown caterpillars as on the smaller, but none are safe from their attacks.

The Warblers, Mnioiltidæ.

It was not until 1899 that the value of the warblers as caterpillar eaters was fully established. As they are small birds and feed mainly on the smaller larvæ it is very difficult to determine by observation exactly what they are feeding on.

A special effort was made during 1899 to secure accurate data in regard to the destruction of the smaller hairy caterpillars by warblers. The result has demonstrated that warblers are certainly among the most useful birds in this respect, especially during the early part of the season, when most larvæ are small. They appear so fond of these larvæ that they will even cling and climb about on the trunks of the trees to get them. This is noted as a contrast to their usual habit of searching on twigs and branches.

The Mocking Thrushes, Miminæ (subfamily),

Represented by the catbird and brown thrasher, are certainly among the most useful birds. The catbird eats hairy caterpillars greedily, destroying even those covered with spines, like the *Eupanesa antiopa*, and feeds many caterpillars to its young. It eats full-grown caterpillars about as readily as do the cuckoos, taking mainly those that have, perhaps, escaped more arboreal birds by remaining in the shrubbery, near the ground.

The Wrens, Troglodytidæ.

The house wren is the only species that has been seen by our observers to eat hairy caterpillars. It can hardly be called a common bird, and it has only occasionally been seen to eat these caterpillars.

The Nuthatches and Titmice, Paridae.

The chickadee, the common representative of the titmouse family, and one of the most useful of all birds, is a great destroyer of hairy caterpillars. Not only does it eat caterpillars of all sizes, feeding them to its young, but it destroys all forms of these insects, except, perhaps, the eggs of some species. Too much cannot be said in favor of this most useful and harmless bird. Both species of the nuthatch take these larvæ only as they come in their way on the trunks of the trees, and not always even then.

The Thrushes, Turdidae.

While the thrushes eat hairy caterpillars when they come in their way, they do not, with the exception of the robin, appear to search them out. The robin seems to be in this way the most useful of all the thrushes. The wood thrush and Wilson's thrush occasionally visit localities infested by the caterpillars and eat a few, but the robin visits them frequently and eats many. The thrushes eat mainly the larger caterpillars.

The bluebird is useful in destroying most forms of these insects, but as bluebirds are not plentiful in the infested region the opportunity for observation has not been so good as in the case of some other species.

BIRDS OBSERVED FEEDING ON HAIRY CATERPILLARS.

Yellow-billed cuckoo,	<i>Coccyzus americanus</i> (Linn.).
Black-billed cuckoo,	<i>Coccyzus erythrophthalmus</i> (Wils.).
Hairy woodpecker,	<i>Dryobates villosus</i> (Linn.).
Downy woodpecker,	<i>Dryobates pubescens</i> (Linn.).
Yellow-bellied sapsucker,	<i>Sphyrapicus varius</i> (Linn.).
Flicker,	<i>Colaptes auratus</i> (Linn.).
Kingbird,	<i>Tyrannus tyrannus</i> (Linn.).
Great-crested flycatcher,	<i>Myiarchus cinerascens</i> (Linn.).
Phoebe,	<i>Sayornis phoebe</i> (Lath.).
Wood pewee,	<i>Contopus virens</i> (Linn.).
Least flycatcher,	<i>Empidonax minimus</i> (Baird).
Blue jay,	<i>Cyanocitta cristata</i> (Linn.).
Crow,	<i>Corvus americanus</i> (Aud.).
Red-winged blackbird,	<i>Agelaius phoeniceus</i> (Linn.).
Baltimore oriole,	<i>Icterus galbula</i> (Linn.).
Purple grackle or crow blackbird,	<i>Quiscalus quiscula</i> (Linn.).
Chipping sparrow,	<i>Spizella socialis</i> (Wils.).
Field sparrow,	<i>Spizella pusilla</i> (Wils.).
Song sparrow,	<i>Melospiza fasciata</i> (Gmel.).
Towhee,	<i>Pipilo erythrophthalmus</i> (Linn.).
Rose-breasted grosbeak,	<i>Habia ludoviciana</i> (Linn.).
Indigo bunting,	<i>Passerina cyanea</i> (Linn.).
English sparrow,	<i>Passer domesticus</i> (Linn.).
Scarlet tanager,	<i>Piranga erythromelas</i> (Vieill.).
Red-eyed vireo,	<i>Vireo olivaceus</i> (Linn.).
Yellow-throated vireo,	<i>Vireo flavifrons</i> (Vieill.).
Warbling vireo,	<i>Vireo gilvus</i> (Vieill.).
White-eyed vireo,	<i>Vireo noveboracensis</i> (Gmel.).
Black-and-white warbler,	<i>Mniotilta varia</i> (Linn.).
Parula warbler,	<i>Compsothlypis americana</i> (Linn.).
Yellow warbler,	<i>Dendroica aestiva</i> (Gmel.).
Chestnut-sided warbler,	<i>Dendroica pensylvanica</i> (Linn.).
Maryland yellow-throat,	<i>Geothlypis trichas</i> (Linn.).
Black-throated green warbler,	<i>Dendroica virens</i> (Gmel.).
Oven-bird,	<i>Seiurus aurocapillus</i> (Linn.).
American redstart,	<i>Setophaga ruticilla</i> (Linn.).
Catbird,	<i>Galeoscoptes carolinensis</i> (Linn.).

Brown thrasher,	<i>Harporhynchus rufus</i> (Linn.).
House wren,	<i>Troglodytes aedon</i> (Vieill.).
White-breasted nuthatch,	<i>Sitta carolinensis</i> (Lath.).
Red-breasted nuthatch,	<i>Sitta canadensis</i> (Linn.).
Chickadee,	<i>Parus atricapillus</i> (Linn.).
Wood thrush,	<i>Turdus mustelinus</i> (Gmel.).
Wilson's thrush,	<i>Turdus fuscescens</i> (Steph.).
American robin,	<i>Merula migratoria</i> (Linn.).
Bluebird,	<i>Sialia sialis</i> (Linn.).
Cedar waxwing,	<i>Ampelis cedrorum</i> (Vieill.).

BIRDS FEEDING ON THE PUPÆ OR IMAGOS.

Yellow-billed cuckoo.	Towhee.
Black-billed cuckoo	Rose-breasted grosbeak
Hairy woodpecker.	Indigo bunting.
Downy woodpecker.	English sparrow.
Yellow-bellied sapsucker.	Scarlet tanager.
Kingbird.	Red-eyed vireo.
Great-crested flycatcher.	Yellow-throated vireo.
Phœbe.	Black-and-white warbler.
Wood pewee.	Yellow warbler.
Least flycatcher.	American redstart.
Blue jay.	Catbird.
Crow.	Brown thrasher.
Baltimore oriole.	Chickadee.
Chipping sparrow.	Robin.
	Bluebird.

Assuming that our observations have proved that birds eat hairy caterpillars it may be interesting to inquire why has not this fact been previously noticed. It will be seen at once, by one who makes a study of the subject, that the error which has been so long persisted in arises, first, from a lack of careful observation.

It is not strange that the cuckoos should have been known for years to feed on hairy caterpillars. The cuckoos are sizable birds; they are not shy, and as they feed on the larger caterpillars when those insects are full grown, and as both cuckoos and caterpillars are common in the vicinity of dwellings, their habits in this respect could not escape the most casual observer. But to observe the habits of shy birds, such as the crows and jays, which feed on the larger caterpillars, is much more difficult; and to learn the feeding habits of the smaller birds, which feed mainly on the minute larvæ soon after these larvæ have hatched from the egg, is still more difficult. Reliable observations of this class can be made only by trustworthy and skilled observers, who can devote time to the task.

But, it may be asked, why have not those who have dissected the stomachs of the birds discovered that they were eating hairy caterpillars to a considerable extent? To this it may be answered that up to the present time most of the knowledge that has been gained in regard to the destruction of hairy caterpillars by birds has been gained from stomach examinations, and it is by stomach examinations mainly that light has been thrown on this question. Yet he who examines the stomachs of small birds labors under many difficulties in determining the specific character and quantity of food of this class. Minute caterpillars are speedily reduced to a pulpy mass in the bird's stomach. While the field observer may readily identify the small tent caterpillars, for instance, on which the birds are feeding, and even count the number eaten, it might be impossible for the man in the laboratory, working without exact knowledge of the conditions under which the bird was shot, to do either. Many of the larger caterpillars eaten by the smaller

birds are not swallowed whole, but picked to pieces. Therefore the portion of the caterpillar swallowed would be entirely unrecognizable when found in the bird's stomach. Other caterpillars are dissected, as it were, by the bird, and only the internal parts chosen as food. These cannot be identified in the bird's stomach. Orioles, vireos, warblers, titmice and tanagers are among the birds which commonly dissect caterpillars in this way.

This is not a rare or exceptional habit, nor is it difficult to observe. It seems to be a device adopted by the smaller birds mainly when feeding on the larger caterpillars. These caterpillars are probably too large to be swallowed whole by small birds without causing some inconvenience, so they choose the parts which can readily be digested and reject the others.

Wilson Flagg says that he saw an oriole in a black cherry tree kill in one minute seventeen caterpillars, and noticed that the oriole did not swallow the insect, but set his foot upon it, tore it asunder and swallowed an atom taken from the inside. "Had he eaten the whole caterpillar," says Flagg, "three or four would probably have satisfied his appetite. But the general practice of birds that devour hairy caterpillars is to eat only a morsel, hence they require greater numbers to satisfy their wants."

Mr. Mosher records an instance where a red-eyed vireo came into a tree, taking brown-tail moth larvæ, swallowing the smaller ones and pulling the larger ones to pieces, afterwards swallowing some of the pieces. He saw it eat fifteen in the eight minutes it was in sight.

The warbling and yellow-throated vireo have often been observed to do this, though the habit is not constant even with individual birds.

A red-eyed vireo was seen to take a forest tent caterpillar, beat it with his bill, pull it to pieces and eat all the pieces. The next one was treated in the same way, except that he ate the inside only, dropping the skin and head to the ground.

Another red-eyed vireo was seen to eat seventy-three gypsy moth larvæ in forty minutes. The caterpillars were large and he held them with his foot, pulled out certain inner parts and ate them, discarding the rest.

This is a common practice with the chickadees. They hold the larvæ with their feet mainly, tearing them open and devouring a portion or all of the internal parts, leaving the head and skin untouched.

From personal observation and corroborative facts obtained from other observers I am led to believe that this is a habit with many birds. The crows, jays, chickadees and some of the woodpeckers also have the habit of killing caterpillars which they do not eat. Whether the caterpillars are dropped accidentally or wantonly destroyed in mere sport is not known, but many are certainly killed in this way.

The habit of the blue jays of pecking caterpillars and dropping them to the ground has been previously noted by Dr. C. M. Weed in the ninth annual report of the Ohio Agricultural Experiment Station in quoting from the observations of Mr. E. V. Wilcox.

Different species of warblers have also been seen to eat portions of the larger caterpillars, leaving the external parts. A black-and-white warbler was seen to beat a forest tent caterpillar on the ground until she had torn it in pieces, when she took the inside parts and flew away to her nest, leaving the remainder on the ground. She did not return for the parts left.

These things can be learned only by observation, and it will be readily seen that when birds feed in this way it is impossible for one examining the stomach contents to get, by this method alone, an accurate or even an approximate idea of the value of the bird as a destroyer of hairy caterpillars. Birds cannot feed to any extent on hairy caterpillars where such larvæ are few, and unless the dissector knows whether such caterpillars were obtainable where his birds were taken, he cannot form an accurate idea of the value of the bird in this respect.

BIRDS MATERIALLY RESTRICT THE INCREASE OF HAIRY CATERPILLARS.

The writer has earnestly endeavored to determine to what extent birds control the increase of hairy caterpillars. The result of the investigation is not as yet conclusive, but much can be deduced from the array of facts presented.

It is certain that many birds prefer smooth-skinned caterpillars. Many species have not been observed to eat hairy caterpillars at all, while it is safe to say that most land birds feed readily upon smooth-skinned caterpillars. Take for example the larvæ of the canker-worm moths, *Paleacrita vernata* and *Anisopteryx pometaria*. Nearly all species of birds in eastern Massachusetts, from the titmouse to the crow, have been observed to feed upon these larvæ, and when these are abundant most birds seem to prefer them to the hairy caterpillars. The tent caterpillars, hatching as they do very early in the season, form when small a staple food for a great number of birds. Later, as the canker worms appear and the tent caterpillars grow larger and, presumably, more disagreeable to some birds, they are neglected to some degree, while most birds feed on the canker worms. When the canker worms disappear many birds again resume feeding on hairy caterpillars. The presence of a quantity of smooth-skinned caterpillars, therefore, usually benefits the hairy caterpillars.

Every one who has studied carefully the life history of moths has been struck with the great mortality among the young larvæ. In a study of the natural increase of the gypsy moth it was found that where a single egg cluster hatched isolated from its kind most of the caterpillars disappeared while they were quite small; in some cases the entire brood was destroyed.

It is well known that the gypsy moth in Massachusetts has few effective natural enemies except the birds. Birds frequently have been observed feeding upon the young caterpillars, and careful observation indicates that many of them are destroyed by birds before they are half grown. Two instances have been reported where small but flourishing colonies of gypsy caterpillars appear to have been exterminated by birds. Limited outbreaks of the brown-tail moth that have been watched have been so reduced that at the end of the season few or none could be found. Just what proportion of this destruction is due to the parasites and other enemies of the brown-tail moth it is difficult to determine, but the observers are agreed that most of it is due to birds. In some cases the webs of the tent caterpillar are torn open by birds and all or nearly all of the caterpillars in the webs destroyed.

The most striking instance observed of the check exerted by birds on the increase of hairy caterpillars was in Georgetown, Mass., in July, 1899. Here a colony of the gypsy moth had grown and flourished in the woods unknown to any one until it was discovered in midsummer. The moths had been increasing there without any check, excepting their natural enemies, and they had defoliated the trees and shrubbery on at least two acres of land, stripping both pine and hard-wood trees. A vast swarm of caterpillars had been at work there. It was noticeable, however, that the caterpillars were not nearly so numerous at the time of their discovery as had been the case in other localities where they had not done so much injury. In other words, there were not enough caterpillars to account for the destruction of the foliage. The colony was near the edge of the woods, with a field and meadow on one side and an orchard near by. Birds abounded in the vicinity. So soon as one came within hearing distance of the place cries of crows and blue jays were heard in and about the edges of the stripped tract. Many chickadees, tanagers, thrushes, warblers, sparrows, flycatchers and cuckoos were about. At the foot of some of the large trees hundreds of dead and dying caterpillars were found which evidently had been injured

by the beaks of birds. Mr. Mosher watched the locality for a few days and found many species of birds feeding on the caterpillars. He noticed that whenever he left the locality many crows came in and fed. There were very few parasites and other enemies of the gypsy moth in the vicinity, and the conclusion naturally arrived at was that enormous numbers of caterpillars had been destroyed by birds. Thus only could the evident great reduction in the numbers of the caterpillars be accounted for. Many birds were destroying the moth in all its forms, and while they had not succeeded in suppressing the outbreak, it was plain that they were exerting a strong restrictive influence upon the increase and spread of this injurious insect.

RECAPITULATION AND CONCLUSION.

It is to be regretted that it is impossible, because of lack of space, to present in this brief paper more than a few of the carefully recorded facts, through a comparison of which the following conclusions have been reached, and it is hoped that another opportunity for publishing at least a part of these recorded observations may offer.

To recapitulate, —

(1) The widely accepted belief that hairy caterpillars have immunity from the attacks of birds (excepting only the cuckoo) is erroneous.

(2) This error has arisen partly from a lack of painstaking observation, partly from the inadequacy of stomach examinations alone to determine the full value of many birds in this respect, and partly from the well-known partiality evinced by many birds for smooth-skinned caterpillars.

(3) During most of the time when the young birds receive their food from the parents, they require a great quantity of animal food, which consists mainly of caterpillars and other soft-bodied insects.

(4) The parent birds, being overworked at that season in defending their young from many enemies and in providing sufficient food both for themselves and young, take such caterpillars as are most plentiful and readily obtained.

(5) The most destructive hairy caterpillars are gregarious, and many of them reach their maximum of destructiveness usually when many of the young birds are in the nests. The presence of these caterpillars is marked by the evidence of their destructiveness. Their presence is readily detected at a distance by birds, which visit places where such food can be readily obtained in quantities. About forty species are known to visit such places, feeding largely on the caterpillars, while many of them take them to their young. When the young are fledged they are led by the old birds to such localities and taught to feed themselves.

(6) An abundance of smooth-skinned caterpillars, which many birds prefer, tends to limit the destruction of hairy caterpillars by birds.

(7) Birds as a class must be considered as a potent factor in regulating the increase of those moths whose caterpillars are covered with hairs or spines. Many outbreaks of such species are "nipped in the bud" by birds, and they have a large share in the repression of the greater outbreaks.

(8) As certain hairy caterpillars are among the worst pests known to the farmers and fruit growers, those birds which destroy such caterpillars, and which are also in other ways to be considered among our most useful species, should be protected, even if some of them take small wages of fruit to pay for their services.

MASSACHUSETTS
CROP REPORT

FOR THE

MONTH OF OCTOBER, 1899.

ISSUED BY

J. W. STOCKWELL,

SECRETARY STATE BOARD OF AGRICULTURE.

BOSTON :

WRIGHT & POTTER PRINTING CO., STATE PRINTERS,
18 POST OFFICE SQUARE.

1899.

CROP REPORT FOR THE MONTH OF OCTOBER 1899.

211

OFFICE OF STATE BOARD OF AGRICULTURE,
BOSTON, MASS., NOV. 1, 1899.

Bulletin No. 6, Crop Report for the month of October, is herewith presented as the final issue of the season. Trusting that our work in this line has been of value to those receiving the bulletins we shall doubtless resume it when another growing season comes in. The hearty thanks of the office are tendered to our correspondents, whose voluntary reports have made the issuance of these bulletins possible, and we shall look for a renewal of their kind assistance another season.

The special articles printed this season have been: Bulletin No. 1, "Spraying of Crops for Profit," by Prof. S. T. Maynard; Bulletin No. 2, "Suggestions for the Use of Barnyard Manure," by Prof. Chas. Wellington; Bulletin No. 3, "The Elm-leaf Beetle in Massachusetts," by A. H. Kirkland, M.S.; Bulletin No. 4, "Practical Hints for the Dairyman," by Prof. F. S. Cooley; and Bulletin No. 5, "Birds as Destroyers of Hairy Caterpillars," by E. H. Forbush.

The usual scientific article is omitted in this month's issue, but in its place we would call your attention to the articles at the close of the bulletin, — "Nursery Inspection," printed at the request of the Hatch Experiment Station, and "Farmers, prepare for the Twelfth Census," printed at the request of the U. S. Census Office. Each of these articles is timely and important, and the suggestions in each have the hearty approval of this office. You will also find printed at the close of the bulletin an "Index to Crop Reports, which has been prepared by this office for the benefit of those who may desire to preserve a file of the bulletins. For the benefit of any such we will add that we have back numbers on hand and can doubtless fill any vacancies which may exist in the files of any of our readers.

PROGRESS OF THE SEASON.

The October returns of the United States Department of Agriculture (Crop Circular for October, 1899) give the average condition of corn October 1, as 82.7, as compared with 85.2 last month, with 82 on October 1, 1898, and with 81.9, the mean of the October averages of the last ten years.

No estimate of the yield of wheat per acre is made, pending the result of further careful investigations.

The preliminary estimate of the yield per acre of oats is 30.7 bushels, as compared with 27.8 bushels last year, 28.1 bushels in 1897, and a ten-year average of 25.8 bushels. The average for quality is 89.5, 5 points higher than last year and 1.9 above that for 1897.

The preliminary estimate of the yield per acre of barley is 27 bushels, as compared with 21.6 bushels last year, 24.5 bushels in 1897, and a ten-year average of 23 bushels. The average quality is 88.4, against 90.6 last year and 87.6 in 1897.

The preliminary estimate of the yield per acre of rye is 14.4 bushels, as compared with 15.6 last year, 16.1 bushels in 1897, and a ten-year average of 13.7. The average for quality is 90, against 90.2 last year and 92.7 in 1897.

The average condition of buckwheat on October 1 was 70.2, as compared with 75.2 last month, 76.2 in 1898, and 84.2, the mean of the October averages of the last ten years.

The average condition of potatoes was 81.7, as compared with 86.3 last month, 72.5 in 1898, and 73.7, the mean of the October averages of the last ten years.

The average condition of cotton was 62.4, as compared with 68.5 last month, 75.4 in 1898, and 73.5, the mean of the October averages of the last ten years.

On the whole the condition of tobacco remains about as a month ago.

There was a decline of from 1 to 9 points in the condition of sugar-cane during the month in all the sugar-cane producing States, except Florida and South Carolina.

Of the twelve States having 15,000 acres or more of sorghum at the last census, 11 report an impairment in condition during the month.

Rice has generally about held its own, losses in condition in some States being balanced by gains in others.

Of the 13 States having 10,000 acres or upward in sweet potatoes at the last census, 11 report an impairment in condition during the month.

Maine and New York are the only States of large production that do not report a continued decline in the condition of apples.

In Massachusetts the average yield of oats per acre, is given as 35.7, and the average quality as 92; the average yield per acre of barley as 30.3, and the average quality as 94; the average yield per acre of rye as 16, and the average quality as 91; the average condition of corn October 1 as 94; the average condition of buckwheat as 91; the average condition of tobacco as 110; the average condition of potatoes as 97; and the average condition of apples as 36.

MASSACHUSETTS WEATHER, 1899.

[COMPILED FROM DATA FURNISHED BY THE NEW ENGLAND WEATHER SERVICE.]

January was a month without marked departures from normal conditions, the small amount of snow-fall being the chief abnormal condition. The temperature for the month was very slightly in excess of the normal. The monthly average of precipitation was only slightly below the normal, the loss of moisture from the small amount of snow being counterbalanced by an excess of rain-fall.

The first half of February was uninterruptedly cold, and the second half uniformly mild, the mean monthly temperature being about 2° below the normal. The precipitation of the month was practically normal. A typical "coast storm," with violent gales, occurred on the 12th and 14th. Railroad traffic was considerably interfered with, but the loss of life at sea was comparatively small.

March was conspicuous for much unpleasant weather, cloudiness and precipitation being almost constant. An ice-storm of wide-spread area occurred on the 19th, doing considerable damage to trees and telegraph poles. The temperature for the month averaged about 1° below the normal, and at its close the season was backward in all sections.

April was remarkable for the large number of clear and fair days, there being but six stormy days during the month. The early part of the month averaged cool, and the closing days were unusually warm. The average temperature of the month was very near the normal, but there was a marked deficiency in precipitation. Preliminary spring work made excellent progress.

May was remarkably deficient in precipitation, for while the number of days with a measurable amount of precipitation averaged about as usual, there was no good, soaking rain. As the result the precipitation was the smallest since the establishment of the Weather Service in 1870. The temperature averaged about 1° per day above the normal. The coolest period of the month was from the 17th to the 23d, when frosts were prevalent in exposed localities. An abundance of sunshine was a feature of the month. Crop prospects were much impaired by the continued drought of April and May.

The first part of June gave extreme heat and absence of precipitation, less than .9 inch falling at Boston, as against a normal of about 1.75 inches. The temperature of the month was decidedly above the normal, the average daily departure being about 5° plus. The drought was broken during the latter part of the month by severe thunder storms with excessive precipitation, but any damage to fruit and "washing" of fields was more than compensated for by their beneficial effects. Much damage was done to fruit and glass in the western part of the State by a severe hail-storm on the 24th.

General showers occurred in the first week in July, which effectually broke the drought that existed through May and June. These conditions continued until the 18th of the month, but from the 18th to the 25th the showery weather was confined to the western sections of the State. At the end of this period a second drought was complained of in eastern sections, which was, however, relieved by copious showers on the 25th and 26th. The temperature averaged somewhat above the normal, but was generally devoid of extremes. July did much to repair the damage resulting from the dry weather of the two preceding months.

August opened with several days of generally fair weather in all sections, and seasonable temperatures. By the close of the first week the dry weather was seriously felt in the eastern counties, but copious showers occurred in these sections on the 10th and 11th. During the third week of the month there was little or no precipitation, and that of the 22d was principally in the eastern counties, where the drought was most severe. A notable feature of the month was an absence of the usual muggy, oppressive conditions. The weather was somewhat cool from the 7th to the 14th, and unseasonably so at coast stations during the closing week of the month.

September opened with showers on the 1st and 2d, which were of general occurrence and great benefit. The second week of the month was fair with much sunshine, but a sharp falling off of temperature, which had ranged about normal the preceding week. The temperature of the third week was several degrees cooler than the normal of the season. General rains fell on the 20th and 21st of the month. These rains were copious and of great benefit to pastures and meadows. With the rain came warmer weather, and nearly average temperature conditions prevailed in the last week of the month. As a whole the month was exceptionally fine and pleasant.

WEATHER FOR OCTOBER, 1899.

The weather of October was marked by sharp departures, in several of the elements, from the normal conditions of the month. The month opened with a cold wave of unusual severity for the season. The temperature ranged below normal from the 1st to the 9th inclusive, excepting the 5th, which was somewhat warmer than the average. The 2d and 3d days of the month were conspicuously cold, the temperature falling to or near freezing in nearly all sections of the State. The minimum range of the mercury at Boston on these days, 34° and 35° respectively, broke the official record, being the lowest for those days of the month of October in 27 years. A "warm spell" prevailed from the 10th to the 19th inclusive, during which the daily

mean temperature ranged from 1° to 15° above the normal. The thermal conditions for the remainder of the month were near the seasonal average.

There was a general deficiency in the precipitation for the month, the rainfall being little more than half the customary amount for October. It was, however, well distributed through the period and over the territory, and for this reason and the fact that the rainfall for the preceding month was in excess, the supply of moisture was sufficient to maintain seasonable conditions in the soil. The cold weather at the beginning of the month was attended by a snow flurry in many sections. The amount of snowfall in the majority of cases was inappreciable, too small to measure. The date of occurrence was unusually early, and in many sections the earliest in many years.

An abundance of sunshine was a feature in connection with the state of weather. This, combined with the small number of days with rain, made the month unusually pleasant and especially favorable to outdoor pursuits. Owing to the prevalence of dry weather there was much haze, smoke and dust in the atmosphere, giving conditions usually descriptive of the period commonly known by the name of Indian summer.

CROPS OF THE YEAR.

The spring opened later than usual. The cold nights of May held vegetation in check and the dry weather had been most unfavorable for the germination of seeds. Mowings were suffering for want of rain, and feed in pastures was thin and backward. Fall seeding winter-killed more or less. The fruit bloom was much below the normal, and many peach trees were reported killed by the severe winter. Very little damage from insects was reported. Spraying is increasing, but not rapidly. A considerable proportion of the farm help may now be classed as good. Wages average about \$18 per month with board, and about \$1.25 per day without. No marked changes were reported in the acreage of farm crops.

In June there was little or no injury from insects. Indian corn generally did very well, considering the drought, with acreage about as usual. Haying was commencing with a very light crop in all sections. Early potatoes showed an increased acreage and a fair prospect for the crop. Early market-garden crops were much shortened in yield by drought, with generally increased prices. The supply of dairy products ran about as usual, with prices the same. Pastures had suffered severely from drought and were in poor shape. Strawberries were not over half a crop, with prices much better than last year. Apples did not set well and had also dropped badly. Cherries did well. Pears were a little off and plums not nearly up to the average. There were practically no peaches.

July showed a minimum amount of damage from insects. Indian corn made rapid growth and generally promised a good crop. Silos still continue to gain in vogue. Haying was practically completed with from one-half to two-thirds of a crop; quality and condition generally first-class. The shortage of the hay crop lead to a considerable increase in the acreage devoted to forage crops, and they were generally in good condition. Market-garden crops were nearly up to the normal, with prices a little above recent years. Early potatoes were dug in many sections, with only a fair crop. Prices ruled high. Apples, pears and plums promised light crops; quinces fair; grapes good; cranberries good; no peaches. Feed was rather short in pastures, but they were much improved. Rye, oats and barley were below the normal, particularly as to straw.

At the end of August Indian corn was generally in fine condition, though somewhat backward. Rowen was a light crop in all sections, and nearly a failure in the eastern part of the State. Late potatoes looked well and promised a good crop. Very little rot was reported and blight was not general. Barring a little unevenness tobacco was generally in good condition and cutting was practically completed at the end of the month. Grapes promised a good crop, and cranberries at worst, a normal one. Other fruits were very poor, taken as a whole. Pasturage was quite

short in all except extreme western sections. Oats and barley were considerably below the normal, both as to grain and straw. Poultry keeping was generally considered profitable, but is a side-issue save in the southeastern counties.

September showed Indian corn to be a good average crop, and probably rather more in the western counties. The rowen crop was much below the usual average and in many sections was an entire failure. Fall feed was also sadly off in condition. Less than the usual amount of fall seeding has been done, owing to dry weather, and that put in is generally below average in condition. Onions were considerably above an average crop on the whole, particularly in the Connecticut Valley. Potatoes were an exceptional crop in almost all sections, both in yield and quality. Root crops were somewhat in need of rain. Celery was apparently a good average crop. Other late market-garden crops were doing fairly well. Apples were a very poor crop except in a few localities. Pears not half a crop, plums even less, and peaches a failure. Cranberries were rather more than an average crop, of good quality. Grapes were generally abundant and mostly secured without injury from frost.

In the circular to correspondents returnable to this office October 23, the following questions were asked :—

1. Have root crops proved to be average crops?
2. What is the condition of farm stock?
3. What is the condition of fall seeding?
4. How have prices for crops raised for market compared with former years?
5. Which of the leading crops in your locality do you think have been most profitable?
6. Which of the leading crops in your locality do you think have been least profitable?
7. Considered as a whole, has the season been a profitable one for your farmers?

Returns were received from 150 correspondents, from which the following summary has been made,

ROOT CROPS.

Root crops are, generally speaking, in good condition. Some few correspondents report that they are not up to the average in condition, but these reports are nearly, if not quite, balanced by those who report the condition to be unusually good. Potatoes are an unusually heavy crop of excellent quality. There is some complaint as to prices received, but practically none as to the crop itself. Celery appears to be a good, average crop.

FARM STOCK.

There is considerable complaint that farm stock is thin in flesh, because of poor feed in pastures, but otherwise it is generally in good condition. Many farmers have been feeding their stock, particularly cows in milk, at the barn for the past month or more, and if it were not for this we should probably have a much worse report of condition. Feed in pastures appears to be still short in many cases and rain is needed to put them in good shape for the winter.

FALL SEEDING.

Considerably less than the usual amount of fall seeding has been done, because of dry weather. That which is in is also below the average of condition from the same cause. The catch was poor in many cases, and where that has been good there are frequent reports of the seeding being small and backward.

PRICES.

Prices received for farm crops taken as a whole appear to have shown quite a general improvement over former years. This may be due in a measure to shortage in particular crops, but the upward trend of prices cannot be wholly accounted for in this manner. Out of 147 answers to this question 84 correspondents speak of prices as average, 48 as higher than usual and 15 as lower.

MOST PROFITABLE CROPS.

There is the usual diversity of opinion among correspondents as to which crops have proved most profitable, and as last year a majority fail to unite on any one crop. Sixty-nine consider potatoes to have been among the most profitable crops; 42, corn; 36, hay; 16, apples; 12, tobacco; 9, cranberries; 8, sweet corn; 6, cabbages; 5, asparagus; 4, ensilage corn; 3, celery; 2, onions; 2, beans; 2, milk; 2, strawberries; 2, peas; 1, rye; 1, root crops; 1, small fruits; 1, fruit; 1, beans; 1, lettuce; 1, spinnach; 1, carrots and 1, parsnips.

LEAST PROFITABLE CROPS.

Twenty-five correspondents speak of hay as among the least profitable crops; 22, apples; 22, potatoes; 13, onions; 12, squashes; 9, corn; 8, fruit; 6, oats; 6, milk; 6, tomatoes; 6, peas; 4, cabbages; 3, beans; 3, peaches; 3, strawberries; 2, buckwheat; 2, barley; 2, grain; 2, melons; 2, root crops; 2, small fruits; 1, cucumbers; 1, pears; 1, grapes; 1, celery; 1, cranberries; 2, market-garden crops; 1, beets; and 1, turnips.

PROFITS OF THE SEASON.

Taking into consideration both the results obtained from a classification of the returns, and the general tone of the returns themselves, we are led to believe that the past year has been a more than usually prosperous one for our farmers. Almost all crops have made at least good average yields, and where there has been any shortage it has usually been compensated for by increased price received. Most farmers had a surplusage of hay on hand at the beginning of the season, so that the light hay crop will not be as severely felt as would otherwise have been the case. Of 138 correspondents answering the question as to the profits of the season, 91 regard the season as profitable, 29 as an average one for profit and 23 as fairly profitable, while 29 think that it has not been a profitable one.

NOTES OF CORRESPONDENTS.

(Returned to us Oct. 22.)

BERKSHIRE COUNTY.

Egremont (J. H. ROWLEY). — Root crops are up to the usual average. Farm stock is in No. 1 condition. Fall seeding is in fairly good shape. Full average prices have prevailed for crops raised for market. Corn has been our most profitable crop and apples our least profitable one. The season has been a profitable one for farmers in this vicinity.

Alford (L. T. OSBORNE). — Root crops are up to the usual average. Farm stock is hardly up to the average in condition owing to injury to pasturage from early frost. Fall seeding is in average condition. Prices have been better than for some years on nearly all crops except onions. Hay and corn have been our most profitable crops and oats and buckwheat our least profitable ones. The season has been a profitable one, more so than for some years.

West Stockbridge (WM. C. SPAULDING). — Root crops are in good condition; especially potatoes, which are abundant and excellent. Farm stock is in very good condition on the whole. Fall seeding is in fair shape and that put in early is forward. Prices have been about as usual for all crops. Corn and oats have been our most profitable crops and grass our least profitable one. The season has been a good one on the whole.

Lee (A. BRADLEY). — Farm stock is in good condition. Prices have ranged about as usual except for hay, where the price has been 15 per cent off. Apples are a fair crop, quality No. 1. Hay an average crop, quality good. Potatoes an average crop, quality No. 1. Cabbages fully an average crop. Considered as a whole, the season has been profitable and farmers have done well.

Becket (WM. H. SNOW). — Root crops have proved to be about average. Farm stock is not in quite as good condition as last year, owing to feed being short. Fall seeding is in very good shape, but has not made as good growth as some years. Prices for crops raised for market have been about as usual. Corn and

potatoes have been our most profitable crops and corn our least profitable one. I think the season has been a profitable one, considered as a whole.

Washington (E. H. EAMES). — Root crops have proved to be about average. Farm stock is in good condition, better than last year. Fall seeding is in good condition. Prices for market crops have ranged about the same as other years. Corn and potatoes have been our most profitable crops and there have been no unprofitable ones. The season has been a profitable one, all crops yielding well and bringing fair prices.

Cheshire (L. J. NORTHUP). — Root crops are a good average, blight not appearing on potatoes as last year. Farm stock is looking fairly well. Fall seeding is not nearly in as good condition as last year. Prices have been well sustained and compare favorably with other years. Potatoes have been our most profitable crop on account of price and quantity, and apples our least profitable one. The season will compare very favorably with former years as to profit.

Savoy (W. W. BURNETT). — Root crops are a full average yield on the whole. Farm stock is in fine condition. But little fall seeding has been done on account of dry weather and that put in is backward. Prices for farm crops are a full average. Hay and potatoes have been our most profitable crops. The season has been fairly profitable, all kinds of farm products having commanded a fair price.

Williamstown (S. A. HICKOX). — Root crops are up to the usual average. Farm stock is in fair condition. Fall seeding is not up to the average in condition. Prices have been good for crops raised for market. Hay has been our most profitable crop and oats our least profitable one. Considered as a whole the season has been a fairly profitable one.

FRANKLIN COUNTY.

Charlemont (S. W. HAWKES). — Very few root crops are grown here. Farm stock has come from the pastures looking well. Fall seeding never looked better. Prices for crops grown for market have not been as high as usual. Corn and apples have been our most profitable crops and potatoes our least profitable one. Considered as a whole, the season has been a profitable one for our farmers.

Colrain (A. A. SMITH). — Root crops are not up to the usual average. Farm stock is in good condition. Fall seeding is looking finely. Prices for crops grown for market have been less than

usual. Apples have been our most profitable crop and potatoes our least profitable one, as they bring but forty cents a bushel and there has been much rot. Considered as a whole the season has not been a profitable one. Dairy products are low in price with a surplus of milk.

Gill (F. F. STROUGHTON). — Root crops are up to the usual average. Farm stock is rather thin in flesh. Fall seeding is in good condition on rich, moist land. Potatoes have brought low prices and apples high ones. Corn has been our most profitable crop and cucumbers our least profitable one.

Ashfield (CHAS. HOWES). — Root crops are above the usual average in yield and condition. Sheep have done well, but cattle in dry pastures are not looking as well as usual. Prices are higher than usual for most farm products. Hay, apples and tobacco have been our most profitable crops and potatoes our least profitable one, owing to low prices. Although some parts of the season have been very dry I consider the year the best paying one for our farmers for several years.

Deerfield (CHAS. JONES). — Root crops are up to the usual average. Farm stock is in good condition, but there is little neat stock kept except milch cows. A fair amount of fall seeding has been done and it is looking fairly well. Prices have been about average for crops raised for market. Tobacco has been our most profitable crop and onions our least profitable one. Onions are a fair crop, but bring low prices. Considered as a whole, the season has been a profitable one to our farmers.

Sunderland (J. M. J. LEGATE). — Root crops have proved to be up to the usual average. Farm stock is looking well. Fall seeding is looking well. Prices for crops grown for market are about average, onions below and tobacco above. Tobacco has been our most profitable crop and corn and onions our least profitable ones. I think the season has been a profitable one, as onions, though low in price, have yielded enormously and tobacco is a splendid crop and has sold at good prices.

Montague (C. S. RAYMOND). — Root crops are a little more than average crops. Farm stock is in average condition. Fall seeding is in fair condition but not up to the usual average. Prices for farm crops have been somewhat below those of former years. Corn has been our most profitable crop and potatoes our least profitable one. The season has been a profitable one, considered as a whole.

Wendell (N. D. PLUMB). — Root crops are above the average in condition. Farm stock is looking well. Fall seeding has a good start and looks well. Prices for crops grown for market

have been about normal this season. Corn and potatoes have been our most profitable crops and hay and oats our least profitable ones. The season has been above the average for profit.

Orange (ANSEL HARRINGTON). — Root crops are not quite average in quantity but are of very good quality. Farm stock is in very good condition. Fall seeding has not come up very well and is backward on account of dry weather. Prices for farm crops have been about the same as in former years. Corn for the silo and hay have been our most profitable crops and apples and grain of all kinds our least profitable ones. The season has not been an average one for profit on account of the short hay crop, which is the most important crop in this section.

HAMPSHIRE COUNTY.

Prescott (W. F. WENDERMUTH). — Root crops are up to the usual average as to yield and quality. Farm stock is in good condition. Fall seeding is in fair condition. Prices for crops grown for market have been fully up to the average. Potatoes and corn have been our most profitable crops and cabbages our least profitable one. Considered as a whole, the season has been fairly profitable.

Pelham (J. L. BREWER). — Root crops are not quite up to the average. Farm stock is in fair condition. Fall seeding is looking well. With the exception of potatoes prices for farm crops have been up to the average. Potatoes and corn have been our most profitable crops and hay our least profitable one. Considered as a whole, the season has been a profitable one.

Amherst (WM. P. BROOKS). — Root crops are much better than the average. Farm stock is in good condition. Fall seeding is in good condition. Prices for potatoes and onions are low, cabbages and squashes high, hay fair, tobacco good. Tobacco, onions and potatoes have been our most profitable crops and hay has been our least profitable one. The season has been an unusually profitable one.

Hadley (H. C. RUSSELL). — Root crops are not up to the usual average. Farm stock is in good condition. Fall seeding is in very good condition. Prices for crops raised for market have been a little higher than the average. Tobacco has been our most profitable crop and potatoes our least profitable one. Considered as a whole, the season has been somewhat above the average for profit.

South Hadley (H. W. GAYLORD). — Root crops are up to the usual average and potatoes on the heavier soils were an extra crop

of fine quality. Farm stock looks fairly well, but young stock has not made the growth it usually does. Fall seeding looks well for the length of time it has been growing. Prices for farm crops have been fully up to the average, apples high. Potatoes have been our most profitable crop and oats our least profitable one. The failure of the hay crop and the almost total loss of fruit must make the season an unprofitable one.

Northampton (D. A. HORTON).—Root crops are up to the usual average. Farm stock is in poor condition. Fall seeding is in good condition. Prices for farm crops have been above the average of the last five years. Tobacco has been our most profitable crop and onions our least profitable one. Considered as a whole, the season has been a profitable one.

Southampton (C. B. LYMAN).—Root crops have done fairly well. Farm stock is in fair condition. Fall seeding is looking well. The prices of crops grown for market have been rather better than usual. Corn, potatoes and tobacco have been our most profitable crops. The hay crop, our great leading crop, has been light, but cannot be called unprofitable. The season has been rather more profitable than the average, the dairy having suffered most.

Huntington (H. W. STICKNEY).—Root crops are rather more than an average. Farm stock is looking finely. It has been rather dry for fall seeding. Prices have been better than average for most farm crops. Hay has been our most profitable crop and potatoes our least profitable one, owing to low prices. Before apple picking was begun a half crop was expected, but the crop has turned out to be fully average as to quantity and of superior quality. Considered as a whole, the season has been a profitable one.

Middlefield (J. T. BRYAN).—Root crops have proved to be about average crops. All stock is in excellent condition. Little fall seeding has been done owing to dry weather. Prices have been good, except for potatoes, which rule low. Corn has been our most profitable crop and potatoes our least profitable one. Apples are plenty with some and are selling for \$1.50 per barrel. Some of our farmers have considerable young stock to sell, but buyers are few. The season has been a profitable one.

HAMPDEN COUNTY.

Blandford (E. W. BOISE).—Root crops are about 10 per cent off from the average owing to dry weather. Farm stock will go into the barns in good average condition. Very little fall seeding

has been done as the soil has been too dry to work. Prices for farm crops have been fully up to the average. Corn has been our most profitable crop and potatoes bid fair to be our least profitable one if prices go as low as are now indicated. The season has been a profitable one as excess in some crops will balance shortage in others.

Granville (JOSEPH WELCH). — Root crops are up to the usual average. Farm stock has been very good considering the dry season. Fall seeding has come on very well in spite of the dry weather. Prices have been good for all crops except potatoes. Apples and hay have been our most profitable crops and potatoes our least profitable one. Considered as a whole the season has been a profitable one.

Russell (E. D. PARKS). — Root crops are average, with the exception of turnips, which have not yielded well. Farm stock is in about the usual condition. Fall seeding is not in first class shape. Prices for crops raised for market have ruled about average. Potatoes and hay have been our most profitable crops. The season has been a fair one for profit, although the shortage in the hay crop has hurt us somewhat.

West Springfield (T. A. ROGERS). — Root crops are about average, but late sown turnips have grown slowly. Farm stock is generally in good condition, but has to be fed heavily at the barns. Fall seeding is looking well. Prices have been about as in former years, perhaps a shade better. Hay, potatoes and tobacco have been our most profitable crops and onions, fruit and milk our least profitable ones. The season has been a fairly profitable one.

Chicopee (R. W. BEMIS). — Root crops have been about the average. Farm stock is generally in good condition. Fall seeding is in quite good condition. Prices for farm crops have held well up with other years. Tobacco, rye, oats, corn and potatoes have been our most profitable crops and hay and onions our least profitable ones. Considered as a whole, the season has been a profitable one.

East Longmeadow (J. L. DAVIS). — Root crops are about three-fourths of the usual average. Farm stock looks better than could be expected, owing to a liberal use of grain. Very little fall seeding was done and it is not very forward. Prices for farm crops have been lower than usual. None of the crops raised for market have paid, but corn has been the most profitable. Hay has been our least profitable crop. The season has not been a profitable one owing to prices received.

Hampden (J. N. ISHAM). — Potatoes are considerably above the average; root crops good average crops. Farm stock is a little

inclined to be thin in flesh owing to short pasturage. Fall seeding is looking very well and is growing fast. Prices for farm crops have compared well with former years. Apples and hay have been our most profitable crops and none of our leading crops have been unprofitable. The season has been a fairly prosperous one for our farmers.

Monson (A. H. WHITE). — Root crops are up to the usual average and potatoes rather above. Farm stock is in fair condition though the season has been a poor one for feed. Fall seeding is looking very well. Prices for crops raised for market have been about average. Apples have been our most profitable crop and potatoes our least profitable one. I think the season has not been profitable, owing to a shortage of hay and feed in pastures.

Holland (FRANCIS WIGHT). — Root crops have proved to be up to the average. Farm stock is rather thin in flesh. Fall seeding is backward and but little has been done. Prices for farm crops are about average with other years. Corn and potatoes have been our most profitable crops and hay has been a light crop. The season has been very fair; an average one for profit when compared with other years.

WORCESTER COUNTY.

West Brookfield (L. H. CHAMBERLAIN). — Root crops are about 85 per cent of an average crop. Farm stock is in good condition. Fall seeding is looking well. Prices for crops raised for market have been fully up to the average. Ensilage corn has been our most profitable crop and field corn our least profitable one. Considered as a whole, the season has been a profitable one.

Oakham (JESSE ALLEN). — Root crops are up to the usual average. Farm stock is in fair condition. Fall seeding is in good condition. Prices have been about average for crops raised for market. Milk has been our most profitable product and fruit our least profitable one. Considered as a whole, the season has been fairly profitable.

Dana (E. A. ALBEE). — Root crops are up to the usual average. Farm stock is in good condition, but has been fed in the barn because feed has been short. Fall seeding came up well, but has not made very much growth. Prices for farm crops are about average. Potatoes have been our most profitable crop and corn our least profitable one. Considered as a whole, the season has been a fairly profitable one.

Winchendon (W. H. SAWYER). — Root crops are rather above the usual average. Farm stock is about 10 per cent off in condition. Fall seeding is 15 per cent off in condition. Corn has been

our most profitable crop, yields of 80 bushels to the acre and 3 tons of fine stover having been obtained in some instances, and potatoes our least profitable one. Considered as a whole, the season has been a profitable one, though one of the worst known for the production of milk and butter.

Ashburnham (A. NEEDHAM). — Root crops are rather above the average in condition. Farm stock is looking well. Fall seeding is in fair condition. Prices for farm crops have been rather better than usual, with quicker sales and prompt payments. Potatoes and hay have been our most profitable crops. The season has been a profitable one for wide-awake and progressive farmers.

Princeton (A. O. TYLER). — Root crops are up to the usual average. Farm stock is in good condition. Fall seeding is in fair condition. Prices for crops raised for market have been lower than usual. Corn has been our most profitable crop. I think the season has been a profitable one, taken as a whole.

Lunenburg (J. L. HARRINGTON). — Root crops are up to the usual average. Farm stock is in good condition as to flesh, but cows are not giving as much milk as usual. Very little fall seeding has been done. Prices for farm crops have ranged higher than usual. Apples have been our most profitable crop and milk our least profitable product. The season has been a fairly profitable one. Good milch cows are very scarce and high.

Harvard (JOHN S. PRESTON). — Root crops are up to the average in quantity and above it in quality. Farm stock is looking well, though young stock is not quite as fat as some years. Fall seeding is a little backward owing to drought. Prices have averaged very well. Hay and corn have been our most profitable crops. The season has been as profitable as usual.

Bolton (H. F. HAYNES). — Root crops are not over half crops this year. Farm stock is generally thinner than usual owing to shortness of feed in pastures. Early sown fall seeding is in poor condition, but that sown late looks well. Potatoes have been our most profitable crop, yield good and prices fair, and hay has been our least profitable one. The season has not been a profitable one, hay crop light, pastures poor, milk low and grain well up in price.

Northborough (J. K. MILLS). — Root crops have proved to be about average. Farm stock is looking well. Fall seeding is in good condition. Prices have been about as usual for all crops except cabbages, which have sold for a little better price. Asparagus, celery, potatoes, cabbages and corn have been our most profitable crops, and apples, grapes, milk, beans, squashes and peaches our least profitable ones. Some farmers have had a profitable season, while others have not owing to the dry weather.

Southborough (E. F. COLLINS). — Root crops are hardly up to the average. Farm stock is in fair condition, but more grain than usual has been fed on account of short pastures. Fall seeding is in very good condition. Most crops have sold rather above the average price. Apples, sweet corn and potatoes have been our most profitable crops, and milk and tomatoes our least profitable ones. The season has not been an average one on account of dry pastures nearly the whole year and the short hay crop.

Worcester (S. A. BURGESS). — Root crops have proved to be up to the average. Farm stock is in good health, but not quite up in flesh. Fall seeding is in pretty good condition. Prices for farm crops have averaged better than usual. Fodder corn has been our most profitable crop and hay our least profitable one. Considered as a whole the season has been a profitable one.

Sutton (C. P. KING). — Root crops are about average crops. Live stock is thin owing to the poor condition of the pastures the past summer. The ground is dry, but fall seeding is coming up fairly well. Potatoes and onions have been lower in price than usual, other crops a trifle higher. Hay, apples and potatoes have been our most profitable crops and melons and potatoes our least profitable ones. The season has not been a profitable one, as lack of rain injured crops to a great extent.

Mendon (J. N. NUTTER). — Root crops are up to the usual average. Farm stock is not looking as well as usual. What fall seeding has been done looks very well. Prices for farm crops have been about the same as other years. Potatoes and corn have been our most profitable crops, and apples our least profitable one. I think as a whole the season has been quite profitable for the farmer.

Uxbridge (AUGUSTUS STORY). — Root crops are very nearly up to the average. Farm stock is in fairly good condition. Fall seeding is looking very well, but is not quite up to the average. Prices have compared favorably with other years, but potatoes have sold for less than last year. Hay, corn, potatoes, onions and apples have been our most profitable crops, and squashes, tomatoes, beans, celery and cranberries our least profitable ones. Heavy rain is much needed to replenish springs and brooks, which have never been so low to my knowledge. Considered as a whole, the season has been a profitable one.

MIDDLESEX COUNTY.

Ashland (C. E. ADAMS). — Root crops are up to the usual average. Farm stock is in fair condition, but not up to an average with other seasons. Fall seeding is in poor condition. Prices

have been about as usual. Potatoes have been our most profitable crop and hay our least profitable one. Considered as a whole, the season has not been a profitable one.

Framingham (H. S. WHITTEMORE). — All kinds of roots have been average crops. Farm stock is looking well considering the short feed in pastures. Fall seeding is in good condition and looking well. Prices have ruled higher than for several years. Sweet corn, beans, cucumbers and cabbages have been our most profitable crops and onions and potatoes our least profitable ones. As a whole, the season has been a profitable one for the farmer.

Boxborough (J. F. HAYWARD). — Root crops are up to the usual average. Farm stock is in fair condition. Fall seeding is not as good as some years. Prices for crops raised for market have been a little higher than usual. Corn has been our most profitable crop. Considered as a whole, I should say that the season has been a profitable one.

Ashby (A. WETHERBEE). — Root crops are up to the usual average. Farm stock is in very good condition. Fall seeding looks very well. Including butter and cream prices for farm crops have been a good average. Hay and corn have been our most profitable crops and apples our least profitable one. The season has not been above the average for profit.

Dunstable (A. J. GILSON). — Root crops have proved to be good average crops, but are not very extensively raised in this locality. Farm stock is generally in good condition. Fall seeding is somewhat late, but is in very good condition. The prices for crops raised for market have been rather below those of former years. Hay and corn have been our most profitable crops and milk, potatoes and the small grains our least profitable ones. Considered as a whole, the season has been about an average one for profit.

Chelmsford (P. P. PERHAM). — Root crops are above the average. Farm stock is in good condition. Fall seeding made a good catch and promises well. Good average prices have prevailed for all crops raised for market. Hay has been our most profitable crop and apples our least profitable one. Taken as a whole, the season has been nearly if not quite an average one for profit.

Carlisle (E. J. CARR). — Root crops have proved to be up to the usual average. Farm stock is in fair condition. Fall seeding is in poor shape. Prices for crops raised for market have been above the average. Corn has been our most profitable crop and potatoes our least profitable one. We do not consider the season a profitable one because of the poor crop of hay and the poor condition of our pastures.

Concord (WM. H. HUNT). — Root crops are up to the usual

average. Farm stock is up to the average in condition. Fall seeding suffered at first from dry weather, but is now doing well. Prices have been rather better than last year. Asparagus, strawberries and early truck crops have been our most profitable crops and squashes and onions our least profitable ones. On the whole, I should say that the season had been a fairly profitable one.

Woburn (W. H. BARTLETT). — Root crops have done as well as could be expected. Farm stock is in very good condition indeed. Fall seeding is now looking very well. Prices for farm crops have been better than usual for the whole season. Asparagus has been our most profitable crop and winter squashes our least profitable one. The season has been about an average one for profit; we have to pay more than our share of the taxes, pay our help more than they will earn, and with our fertilizer bills and running expenses there is very little left.

Stoneham (J. E. WILEY). — Root crops are up to the usual average. Farm stock is in good condition. Fall seeding is in good condition. Prices for farm crops have been better than usual. Lettuce has been our most profitable crop and squashes our least profitable one. Considered as a whole, the season has been a profitable one.

Winchester (MARSHALL SYMMES). — Beets are not an average crop, but white turnips are better than usual. Farm stock is in good condition. Rye and grass seed came up very well. Prices for crops raised for market have been generally better than for two years past. Spinach has been our most profitable crop. Considered as a whole, the season has been a profitable one. Warm weather with rain has made the grass fresh and green, and has helped the late turnips and cabbage.

Newton (OTIS PETTEE). — Root crops are very fair when late planted. Some fields of rye are looking very well, but little fall seeding was done. Prices for crops raised for market have been a fair average with last year. Corn and celery have been our most profitable crops and hay our least profitable one. Mainly owing to the extreme drought of the early season farming has not been quite as profitable as other years.

ESSEX COUNTY.

Haverhill (EBEN WEBSTER). — Root crops are rather above the average. Farm stock is in good condition. Fall seeding is in excellent shape. Better prices have been received for crops raised for market than in former years. Early potatoes have done very well. Considered as a whole, the season has been fully as profitable as usual.

Groveland (ABEL STICKNEY). — Root crops are not quite up to the average. Farm stock is in very good condition considering the dry season. Fall seeding is somewhat late but made a good catch. Prices for farm crops have been fair. Hay has been our most profitable crop and apples our least profitable one. I think the farmer has no reason to complain of the profits of the season.

West Newbury (J. C. TARLETON). — Root crops have been up to the usual average. Farm stock is in good condition. Fall seeding is in extra good shape there not being a poor piece in town. Corn, apples and potatoes have been our most profitable crops and onions and strawberries, which are two of our leading crops, our least profitable ones. The season has not been an average one for profit, owing to the failure of the usual leading crops.

North Andover (PETER HOLT, JR.). — Most root crops are fully average. Farm stock is in poor condition on account of dry pastures and short feed. The season was too dry for early fall seeding, but the late sown is looking well. Garden truck has brought good prices all the season. Crops have suffered very little from the drought with the exception of the hay crop. All things considered, the season has been as profitable as usual.

Topsfield (B. P. PIKE). — Root crops have not been up to the usual average. Farm stock is in fair condition. Not as much fall seeding has been done as commonly and it is in poor condition. Prices for crops raised for market have been rather above the average. Potatoes have been our most profitable crop and hay our least profitable one. Considered as a whole the season has been a profitable one.

Wenham (N. P. PERKINS). — Carrots and parsnips are good average crops, but beets are not. Stock has been fed heavily at the barn and is in average condition. Fall seeding was a long time in coming up, but is now looking well although backward. Prices for early crops were rather better than usual, for late ones about the same. Sweet corn, early potatoes, carrots and early parsnips have been our most profitable crops and onions, late potatoes, squashes, tomatoes, apples and small fruits our least profitable ones. Considered as a whole, the season has been a profitable one, although the hay crop was very short, which will increase the expense of keeping stock through the winter.

NORFOLK COUNTY.

Medway (MONROE MORSE). — Fall seeding is not very promising. Prices for crops raised for market have been somewhat higher than last year. Potatoes have been our most profitable crop and apples our least profitable one. I think the season has

been somewhat less unprofitable than some of the recent preceding years.

Millis (E. F. RICHARDSON). — Root crops are not quite up to the usual average. Farm stock is below the average in condition showing the effects of the poor pasturage this season. Fall seeding is in poor condition. Prices for farm crops have been lower than usual. Potatoes and corn have been our most profitable crops and milk our least profitable product. Considered as a whole, the season is not quite up to the average for profit.

Franklin (C. M. ALLEN). — Root crops are 20 per cent below the usual average of condition. Farm stock is not up to the average in condition because of poor pasturage. Fall seeding is 20 per cent off in condition. Potatoes have been our most profitable crop and fruit our least profitable one. There is no profit in average farming.

Foxborough (E. A. MORSE). — Root crops have not been up to the usual average. Cows are plenty and yet prices for good ones are high, plenty of fall feed, and stock in good condition. Fall seeding is looking finely. Prices for crops raised for market have been above the average. Peas, shell beans and sweet corn have been our most profitable crops and potatoes, onions and cabbages our least profitable ones. The season has been a profitable one, as prices have been better than usual. The cranberry crop has been about average, but the frost injured fully 10 per cent of it.

Sharon (E. E. NARAMORE). — Root crops are up to the usual average. Farm stock is looking well. The condition of fall seeding is very satisfactory. Potatoes have been our most profitable crop and peas and tomatoes our least profitable ones. For the ordinary farmer the season has been less profitable than usual.

Canton (E. V. KINSLEY). — Root crops are poor owing to the failure of the seed to germinate well. Farm stock is in fairly good condition. Fall seeding is later than usual, but has made a good catch. Potatoes, cabbages, peas and string beans have been our most profitable crops and tomatoes our least profitable one. The season has not been a profitable one, for the reason that milk, which is largely produced here, has brought lower prices than usual, while the cost of production has been greater than usual because of the failure of the hay crop.

BRISTOL COUNTY.

Mansfield (WM. C. WINTER). — Root crops have proved to be about average. Farm stock is generally in good condition. Very little fall seeding has been done and that which has been put in is very backward. Cabbages and potatoes have brought lower prices

than usual, other crops a little higher. Hay has been our most profitable crop and cabbages our least profitable one. Considered as a whole, the season will be about an average one for profit.

Norton (WM. A. LANE).—Root crops are up to the usual average. Farm stock is in good condition. Fall seeding is in good condition. Prices for crops raised for market remain about the same as usual. Corn has been our most profitable crop and potatoes our least profitable one. Considered as a whole, the season has been a profitable one.

Raynham (N. W. SHAW).—Root crops are up to the usual average. Farm stock is in good condition. Fall seeding is in good shape but backward owing to the dry weather. Prices for farm crops have been fully up to the average. Potatoes have been our most profitable crop and hay our least profitable one. Considered as a whole, the season has been about an average one for profit.

Berkley (R. H. BABBITT).—Root crops have proved to be up to the usual average. Farm stock is below the average in condition. Fall seeding is in fair condition considering the dry weather. Prices have been fair for all crops except strawberries. Potatoes have been our most profitable crop and strawberries our least profitable one. I think the season has been rather below the average for profit.

Dartmouth (L. T. DAVIS).—Root crops are hardly up to the average, owing to severe drought. Farm stock is in fully as good condition as could be expected. Fall seeding is rather backward but otherwise all right. Prices for crops raised for market have been rather below the average. Potatoes have been our most profitable crop and market-garden crops and hay our least profitable ones. The season has not been a profitable one because of low prices of leading crops and the failure of the hay crop, which increases the cost of the production of milk.

Acushnet (M. S. DOUGLAS).—Root crops are up to the usual average. Farm stock is in rather poor condition. Fall seeding is not very promising. Prices for crops raised for market have averaged better than usual. Potatoes have been our most profitable crop and hay our least profitable one. Considered as a whole, the season has been fairly profitable.

PLYMOUTH COUNTY.

Hingham (AARON LOW).—The season has been so dry that root crops are below the average. Most farmers have fed their stock at the barn and so kept it in good condition. The recent rains have improved the condition of fall seeding. Prices of most farm crops have averaged low. Potatoes have been our most

profitable crop and squashes and melons our least profitable one. The season has been unprofitable to most farmers owing to drought and low prices.

Hanover (H. L. HOUSE). — Root crops are up to the usual average. Farm stock is in good condition. Fall seeding is in very good condition. Prices for farm crops have ranged rather higher than usual. Cranberries, corn and potatoes have been our most profitable crops and all crops have been fairly profitable. The season has been above the average for profit.

Marshfield (J. H. BOURNE). — Root crops are up to the usual average, potatoes and mangolds above; late turnips looking well. Farm stock is generally in good condition, though the pastures have been short requiring extra feed for milch cows. Less than the usual amount of fall seeding has been done and that little failed to germinate well. Prices for farm crops have been about average, though potatoes and onions have been lower. Milk, cranberries and apples have been our most profitable crops and hay our least profitable one. The season has not been quite as profitable as last year.

Pembroke (NATHANIEL MORTON). — Root crops have proved to be up to the usual average. Farm stock is in average condition. Fall seeding is in good shape. Prices for farm crops have not been as high as usual. Hay and cranberries have been our most profitable crops and corn our least profitable one. Considered as a whole, I should say that the season had not been a profitable one.

Duxbury (A. M. GOULDING). — Root crops have proved to be average crops. Farm stock is in good condition. Fall seeding is looking well. Prices for crops raised for market have been about average. Potatoes have been our most profitable crop and hay our least profitable one. Considered as a whole, the season has been a profitable one.

West Bridgewater (C. T. HOWARD). — Root crops are above the average in condition. Our stock is principally milch cows and they are generally in good condition. Fall seeding is looking well. Hay is higher in price and vegetables lower than last year. Strawberries and potatoes have been our most profitable crops and apples our least profitable one. Considered as a whole, the season has been a profitable one.

Bridgewater (ROWLAND CASS). — Root crops are a good average. Farm stock is in good condition. Fall seeding is in good condition. Prices for farm crops have ruled lower than for the past two years. Potatoes have been our most profitable crop and squashes our least profitable one. I do not think the season has been a profitable one.

BARNSTABLE COUNTY.

Bourne (D. D. NYE). — Root crops have proved to be up to the usual average. Farm stock is in very good condition. Fall seeding is in average condition. Prices for crops raised for market have compared favorably with former years. Potatoes have been our most profitable crop and beans our least profitable one. Apples have been a fair crop and in some places an extra good yield. Considered as a whole, the season has been a fair one for profit.

Sandwich (J. R. HOLWAY). — Turnips look well, other roots little raised. Farm stock is in good condition. Very little fall seeding has been done. Prices for crops raised for market have been fully up to the average. Cranberries and apples have been our most profitable crops. White grubs have damaged many crops and in some pastures have nearly destroyed the grass roots. Considered as a whole, the season has not been very profitable.

Harwich (A. N. DOANE). — Root crops have proved to be average crops. Farm stock is in fair condition. Fall seeding is in good condition. Prices for farm crops have compared favorably with other years. Cranberries have been our most profitable crop and hay our least profitable one. Dry weather damaged our upland mowing fields and pastures. Considered as a whole, the season has been a profitable one.

Chatham (E. Z. RYDER). — Root crops have proved to be more than average crops. Farm stock is in fine condition. Less than the usual amount of fall seeding has been done and it is in poor condition, owing to failure to germinate, caused by dry weather. Prices for farm crops have been about as usual. Late potatoes, sweet corn and root crops have been our most profitable crops and strawberries and early potatoes our least profitable ones. The cranberry crop has been good in quality, average in quantity and fair in price. Considered as a whole, the season has been less than an average one for profit.

Orleans (F. H. SNOW). — Root crops are up to the usual average. Farm stock is in fairly good condition. Prices for crops raised for market have been about the same as usual or a little better. Asparagus has been our most profitable crop and hay our least profitable one. I do not think the season has been particularly profitable.

Truro (D. E. PAINE). — Root crops are up to the usual average. Farm stock is in fair condition. Fall seeding is in good condition. Prices for crops raised for market have been about as in former years. Potatoes have been our most profitable crop. Considered as a whole, the season has been a profitable one.

DUKES COUNTY.

West Tisbury (GEO. HUNT [LUCE]). — Root crops are in good average condition. Farm stock is in high condition. Not much fall seeding is done in this locality. Prices for crops raised for market have been higher than usual. Hay has been our most profitable crop and corn our least profitable one. Considered as a whole, the season has been about an average one for profit.

NANTUCKET COUNTY.

Nantucket (C. W. GARDNER). — Root crops are about two-thirds of the usual average. Farm stock is in fair condition. It has been too dry for fall seeding. Prices for farm crops have been about the same as usual. Corn has been our most profitable crop and potatoes and peas our least profitable ones. The season has not been a profitable one on account of the short hay crop. Many of our farmers have had to sell the most of their herds and there will probably be a big shortage of milk another season.

NURSERY INSPECTION.

(Published at the request of the Hatch Experiment Station, Amherst, Mass.)

Losses by the attacks of injurious insects in Massachusetts probably amount to over \$3,000,000 each year. Two-thirds of this sum could usually be saved if the proper methods of treatment were generally known and applied, and that they are not more universally used is much to be regretted. In order to spread this knowledge more widely among the people of this State, the Entomological Division of the Hatch Experiment Station at Amherst offers its services without charge, for the assistance of every resident of Massachusetts who may at any time desire aid in this line.

LOSSES CAUSED BY INSECTS.

A conservative estimate of the loss caused by insects to any crop is 10 per cent a year, and it is too often the case that more rather than less than this sum is lost. This is a direct tax collected by nature and is too generally overlooked, because no crop which has not paid this tax has ever been gathered.

The value of the greenhouse, hothouse, cereal, hay, vegetable and other crops of Massachusetts is given by the last census (1895) as being over \$26,000,000, while if the one-tenth destroyed by insects were added it would be nearly \$29,000,000. As two-thirds of this loss could be avoided it is certainly most desirable to use all measures to reduce nature's tax to its lowest amount.

Much of the loss caused by insects is complete, but much more is partial. The codling moth not only causes many apples to fall before they are half-grown, but in addition so injures those which remain as to greatly reduce their market value. The apple tree tent caterpillar, though it does not attack the fruit, so reduces the foliage that the tree spends its strength in making more leaves just when it should all be directed toward growing and ripening its fruit, which accordingly suffers in this way.

While it is possible to estimate approximately the loss to crops caused by insects, the injury to shade trees, forest trees, lawns, flowering plants, etc., is not of a nature to be calculated, but is certainly very great. Housekeepers are continually troubled by

clothes moths and the Buffalo beetle, by roaches, ants and other insects, while grain dealers and merchants handling cereals find these substances often seriously infested by insects which render them unsaleable.

The proper methods of treatment for different injurious insects vary with the insect, the plant or other object attacked, and often with the local conditions where the injury occurs.

THE SAN JOSÉ SCALE.

The appearance of the San José scale in Massachusetts is a serious matter both to fruit growers and to nurserymen. This pest which has caused the entire destruction of hundreds of acres of fruit trees where it has become abundant, threatens the destruction of all the fruit trees of the Commonwealth if no restraint be placed upon it. This restraint is obtained by inspection and the destruction or other treatment of infested trees to save those which have thus far escaped, and it is for the best interests of every one who suspects the presence of the scale to have an inspection made at once. The Experiment Station has made arrangements to provide a competent inspector for this work whose services may be obtained by any one who desires his stock examined, upon payment of the actual expenses involved by the trip, and who is empowered to issue certificates of inspection which are accepted by other states having inspection laws when plants are carried from Massachusetts into those states.

HOW TO PREVENT LOSS.

It is the desire of the Experiment Station to aid every person in the Commonwealth who may need such assistance—to be of the greatest possible service in every way. And as this assistance is without cost, no one who incurs loss by insect ravages can excuse himself for that loss except on the ground of ignorance that such assistance could be obtained.

To every resident of this Commonwealth the Entomological Division of the Hatch Experiment Station offers its services, and to obtain its assistance a letter of inquiry, with samples of the injury and if possible of the insect causing it, addressed to the Entomologist, Hatch Experiment Station, Amherst, Mass., is all that is necessary to obtain advice as to the proper treatment to pursue.

FARMERS, PREPARE FOR THE TWELFTH CENSUS.

(Published at the request of the U. S. Census Office, Washington, D. C.)

The 12th Census of agricultural products will be taken on June 1, 1900, but it will be of the crops of the calendar year 1899 only, and of the animals, fowls and bees on hand June 1, 1900.

The law requires the census enumerators to take the (1) acreage, (2) tenure, and (3) value of every farm; (4) color of the farmer; (5) value of buildings and permanent improvements; (6) value of implements, machinery, vehicles, sleighs and harness; (7) acreage of irrigated, (8) tile-drained, (9) improved, (10) unimproved and abandoned, (11) owned and (12) leased lands; (13) cost of hired farm labor (exclusive of household service) and of (14) fertilizers; (15) acreage, quantity and value of all grain, (16) hay, (17) forage, (18) vegetables, (19) small, (20) tropic and (21) orchard fruit; (22) seed, (23) cotton, (24) rice, (25) hops, (26) hemp, (27) sugar cane, (28) sugar beets, (29) sorghum, (30) broomcorn, (31) flax and (32) nut crops; (33) nursery and (34) greenhouse stock and (35) area of crops under glass; (36) flowers and flowering and foliage plants and (37) medicinal and (38) aromatic herbs and plants. Also the quantity and value of (39) milk, (40) cream, (41) butter, (42) cheese, (43) honey, (44) wax, (45) eggs, (46) wool, (47), mohair, (48) cider, (49) vinegar, (50) wine, (51) raisins, (52) prunes, (53) dried or evaporated fruits; (54) dried or evaporated vegetables; (55) maple, (56) cane and (57) beet sugar; (58) molasses and (59) sorghum; (60) poultry, (61) forest, (62) meat and (63) miscellaneous products, besides the numbers and values of all (64) cattle, (65) horses, (66) mules, (67) asses, (68) burros, (69) goats and (70) sheep and the numbers and values of all (71) swine, (72) bees and (73) fowls on hand June 1, 1900, and the (74) total income from the farm during 1899.

A "farm" for census purposes, is all the land cultivated under one ownership or management, whether in a single body or separate parcels.

The farm schedule will provide for taking (75) the number of pure blooded animals by breed and (76) "cows kept for milk"

and (77) "cows not kept for milk," separately. It will also gather statistics of (78) home-made, while the manufactures schedule will gather statistics of (79) factory-made cheese and butter, thus separating the two.

All crops, animals and products raised, no matter how disposed of, and, generally speaking, all farm, crop and live stock values will be taken and classified in such a way as to give North, South, East and West, regardless of conditions, seasons or customs, a reasonably full and fair exhibit of the productive strength of the nation, if the farmers furnish to the enumerators the information necessary to do so.

Of course, statistics relating to age, nationality, sex, conjugal relation, education, school attendance, citizenship, profession or trade, birthplace, birth and death ratios, etc., etc., of all classes, will be taken by the divisions of population and vital statistics on separate schedules. As to manufactures of all kinds, large and small, in the city and in the country, the census law says: —

"The inquiries relating to the products of manufacturing and mechanical establishments shall embrace the name and location of each establishment; character of organization, whether individual, co-operative or other form; date of commencement of operations, character of business or kinds of goods manufactured; amount of capital invested; number of proprietors, firm members, co-partners or officers, and the amount of their salaries, number of employees, and the amount of their wages; quantity and cost of materials used in manufactures; amount of miscellaneous expenses; quantity and value of products; time in operation during the census year; character and quantity of power used, and character and number of machines employed."

But, since agriculture is the backbone of the nation — the foundation of national growth and prosperity — its products constituting the chief item of our export trade, it is of deep importance that the farming communities should thoroughly co-operate in an attempt to make the coming census of their wealth and output full and accurate. If they shall not, the reports thereof must necessarily be defective, and all conclusions therefrom misleading and false.

The desired completeness and accuracy, however, cannot be secured by the activity of a few; it must come from the sincere and active help of the farmers and producers of the entire United States or not at all.

In order to be ready for the census enumerators, who will begin their field work on Friday, June 1, 1900, every farmer should prepare, as early as possible, a written record of his acres, crops, live stock, sales, values, etc., so that he may stand side by side in

the next census reports with the business man, who, unlike most farmers, keeps a full set of books showing his transactions, profits and losses in reliable detail.

Persons in any community, especially the foreign born, who do not read and write the English language, or do so with difficulty, should receive, through their English reading neighbors, such suggestions, information and help as will enable them to be equally well prepared to furnish the items which the census enumerator will require.

The superintendents or managers of public institutions which own or lease and cultivate lands, such as agricultural colleges, state universities, experiment stations, state and county hospitals for the insane, city and county workhouses and houses of correction, state reform schools, national and state soldiers' homes, Indian schools, county and town poorhouses, homes for mutes, blind and other defectives, military barracks, light-house keepers, co-operative communities, and so on, will be called upon to report their crops and products in detail the same as private farmers.

Tenants will be required to give the size and value of the farms they rent or lease and the value of the improvements thereon the same as if they were owners.

Persons who will be recorded by the enumerators as "tenants" include those cultivating lands for a fixed rental, working lands "on shares," working lands in partnership with owners for a fixed rental, working lands in partnership with owners on shares, working rented lands practically in partnership with a third party (usually the store-keeper in the South who furnishes supplies for the season) by mortgaging their crops to him in advance, purchasing mere grass or pasture privileges, etc., etc.

Those who for census purposes will be classified as "owners," include individuals, co-partnerships, corporations, public institutions, heirs whose property, divided and undivided, is held in trust, persons foreclosed under mortgage or sold out for taxes but holding over for redemption, homesteaders who have not completed the five year period of cultivation or have not "proved up" by filing final papers, preemptors who intend to pay cash for government lands, purchasers of lands on contract for deed where some of the purchase money instalments are unpaid, occupants of "no-man's lands," or of lands in unsurveyed or mountain regions where metes and bounds are wanting, actual possessors under clouded or controverted titles, and so on.

Farmers who move from one farm to another between the end of the crop year 1899 and the coming of the enumerator on June 1, 1900, should preserve and take with them, for the use of the

enumerator who will call for it, a record of the crops and products of the farm cultivated for 1899. Otherwise the statistics of that farm may be lost.

No information gathered by census officials will be disclosed to private individuals, or assessors, or tax-collectors, or rivals in business at any stage of the work. It will be used and published impersonally, never in connection with the name of the person or corporation to whom it relates, or by whom it was given. The law on this subject is as follows :—

“SECTION 21. That any supervisor, supervisor's clerk, enumerator, interpreter, special agent or other employé, who shall, without the authority of the Director of the Census, communicate to any person not authorized to receive the same, any information gained by him in the performance of his duties, shall be deemed guilty of a misdemeanor, and upon conviction shall be fined not exceeding five hundred dollars.”

The law reaches citizens as well as officers, requiring them to give to the enumerators correct and full information as set forth in the Census Act, and provides fine and imprisonment for “wilfully neglecting or refusing” to do so.

Those wishing to make suggestions or ask for information concerning the pending census, should address the Director of the Census, Washington, D.C. Their communications will be welcome and will receive prompt attention.

INDEX TO CROP REPORTS.

Year, 1896. Bulletins I.-VI., June-October.

- Animals, farm, report on, I., 3.
 Apples, VI., 10.
 Army worm, the, III., 28; V., 12.
 Army worm, the, article on, by A. H. Kirkland, III., 28. Illustrated.
 Babcock milk tester, etc., the, article on, by Geo. M. Whitaker, V., 28.
 Barley, IV., 10.
 Celery, V., 11.
 Cold storage house, description and plan of, I., 37.
 Corn, Indian, II., 9; III., 10; IV., 9; V., 10.
 Correspondents, notes of, I., 14; II., III., VI., 12; IV., 11; V., 13.
 Crops of the year, VI., 7.
 Crow in Massachusetts, the, article on, by E. H. Forbush, IV., 24.
 Dairy products, II., 11.
 Fall seeding, V., 11; VI., 10.
 Farm help and wages, I., 13.
 Farm stock, VI., 10.
 Feed stuffs, concentrated, article on, by Dr. J. B. Lindsey, VI., 23. Illustrated.
 Forage crops, III., 10.
 Fruits and berries, I., 11, 13; II., III., 11; IV., 9; V., 12; VI., 10.
 Grain crops, III., 11.
 Grass crop, the, article on, by Dr. C. A. Goessmann, II., 27.
 Hay, II., III., 10.
 Insects, I., 11; II., III., 9.
 Market-garden crops, II., III., 10.
 Mass. Fruit Growers' Association, report of meetings of, by Prof. S. T. Maynard, I., 28. Illustrated.
 Mowings, I., 11.
 Oats, IV., 10.
 Onions, V., 11.
 Pastures, I., II., III., 11; IV., 10.
 Poultry keeping, IV., 10.
 Potatoes, II., 10; III., V., 11; IV., 9.
 Prices in 1896, VI., 10.
 Root crops, V., 11; VI., 9.
 Rowen and fall feed, IV., 9; V., 10.
 Season, profits of the, VI., 11.
 Season, progress of the, I., 5; II.-VI., 3.
 Spraying, I., 12.
 Temperature and rainfall for the whole country, I., 7; II.-IV., 5; V., 6.
 Tobacco, IV., 9.
 Weather, Massachusetts, I., 6, 9; II., III., 8; IV., 7; V., 9; VI., 5.
 Weather and crops, New England, I., V., 8; II.-IV., 7.

Year, 1897. Bulletins I.-VI., June-October.

- Animals, farm, report on, I., 3.
 Barley, IV., 11.
 Blackberries, culture and varieties, I., 39.
 Celery, V., 11.
 Corn, Indian, II., 9; III., 11; IV., V., 10.
 Correspondents, notes of, I., 13; II., IV., V., 12; III., 15; VI., 16.
 Crops of the year, VI., 11.
 Currant, culture and varieties, I., 34.
 Dairy products, II., 10.
 Elm bark louse, the imported, II., 35. Illustrated.
 Fall seeding, V., 10; VI., 14.
 Farm crops, acreage of, I., 12.
 Farm help and wages, I., 12.
 Farm stock, VI., 13.
 Forage crops, III., 12.
 Fruits and berries, I., II., IV., V., 11; III., 13.
 Fruits, small, in the home garden, article on, by Prof. S. T. Maynard, I., 29. Illustrated.
 Grain crops, III., 13.
 Hay, II., 9; III., 12.
 Horses, systematic feeding and watering of, article on, by Dr. Jas. B. Paige, IV., 28.
 Insects, I., III., 11; II., 9.
 Insects, three shade-tree, article on, by A. H. Kirkland, II., 30. Illustrated.
 Market-garden crops, II., 10; III., 13.
 Milk sours, why, etc., article on, by Geo. M. Whitaker, III., 35.
 Mowings, I., 11.
 Oak pruner, the, II., 34. Illustrated.

Oats, IV., 11.
 Onions, V., 10.
 Pastures, I., IV., 11; II., 10; III., 13.
 Prices in 1897, VI., 14.
 Potatoes, II., IV., V., 10; III., 13.
 Poultry keeping, IV., 11.
 Raspberries, culture and varieties, I., 36.
 Root crops, V., 11; VI., 13.
 Rowen and fall feed, IV., V., 10.
 Season, profits of the, VI., 14.
 Season, progress of the, I., 5, 10; II.-VI., 3.

Spraying, I., 11.
 Strawberries, culture and varieties, I., 29.
 Sugar maple borer, the, II., 30. Illustrated.
 Temperature and rainfall for the whole country, I., 7; II.-VI., 5.
 Tobacco, IV., 10.
 Weather, Massachusetts, I., 6, 9; II., 7; III.-V., 8; VI., 6.
 Weather and crops, New England, I., III., 8; II., 6; IV., V., 7.
 Weeds, Massachusetts, article on, by Prof. Geo. E. Stone, V., 28.

Year, 1898. Bulletins I.-VI., June-October.

Barley, IV., 10.
 Catch-crops, article on, by Prof. Wm. P. Brooks, III., 24.
 Celery, V., 11.
 Corn, Indian, II., IV., 8; III., 9; V., 10.
 Correspondents, notes of, I., III., V., 12; II., IV., 11; VI., 14.
 Crops of the year, VI., 8.
 Dairy products, II., 9.
 Fall seeding, V., 10; VI., 11.
 Farm crops, acreage of, I., 11.
 Farm help and wages, I., 11.
 Farm stock, VI., 11.
 Forage crops, III., 10.
 Fruits and berries, I., II., III., 10; IV., 9; V., 11.
 Green manuring, III., 26.
 Grains, small, III., 11.
 Hay, II., III., 9.
 Insects, I., 10; II., 8; III., 9.
 Market-garden crops, II., 9; III., 10.
 Milk and cream, article on, by Dr. J. B. Lindsey, V., 24.
 Mowings, I., 10.
 Nature's foresters, article on, by E. H. Forbush, I., 27.

Oats, IV., 10.
 Onions, V., 11.
 Pastures, I., IV., 10; II., 9; III., 11.
 Potatoes, II., IV., 9; III., 10; V., 11.
 Poultry keeping, IV., 10.
 Prices in 1898, VI., 12.
 Root crops, V., VI., 11.
 Rowen and fall feed, IV., 9; V., 10.
 San José scale, article on, by A. H. Kirkland, II., 24. Illustrated.
 Season, profits of the, VI., 12.
 Season, progress of the, I., 3, 10; II.-VI., 3.
 Spraying, I., 10.
 Stable disinfection, article on, by Prof. Jas. B. Paige, VI., 32.
 Temperature and rainfall for the whole country, I., 6; II., 4; III.-V., 5.
 Tobacco, IV., 9.
 Tuberculosis and the milk supply, article on, by Geo. M. Whitaker, IV., 29.
 Weather, Massachusetts, I., 4, 8; II., IV., 7; III., 8; V., 9; VI., 5.
 Weather and crops, New England, I., V., 8; II., 6; III., IV., 7.

Year, 1899. Bulletins I.-VI., June-October.

Barley, IV., 10.
 Birds as destroyers of hairy caterpillars, article on, by E. H. Forbush, V., 28.
 Celery, V., 10.
 Census, twelfth, concerning the, VI., 32.
 Corn, Indian, II., III., 10; IV., V., 9.
 Correspondents, notes of, I., III., 13; II., V., 12; IV., 11; VI., 13.
 Cow stables, IV., 35.
 Cows, quality of, IV., 37.
 Crops, soiling, IV., 30.
 Crops of the year, VI., 8.
 Dairy products, II., 11.

Dairyman, practical hints for the, article on, by Prof. F. S. Cooley, IV., 29.
 Elm-leaf beetle in Massachusetts, the, article on, by A. H. Kirkland, III., 31. Illustrated.
 Fall seeding, V., 10; VI., 11.
 Farm crops, acreage of, I., 12.
 Farm help and wages, I., 11.
 Farm stock, VI., 11.
 Forage crops, III., 11.
 Fruits and berries, I., IV., 10; II., V., 11; III., 12.
 Grains, small, III., 12.

- Hay, II., III., 10.
 Insects, I., 11; II., 9; III., 10.
 Insects, losses caused by, VI., 30.
 Manure, barnyard, suggestions for the use
 of, article on, by Prof. Chas. Wellington,
 II., 29.
 Market-garden crops, II., 10; III., 11.
 Milk, care of, IV., 36.
 Mowings, I., 10.
 Nursery inspection, VI., 32.
 Oats, IV., 10.
 Onions, V., 10.
 Pastures, I., IV., 10; II., 11; III., 12.
 Potatoes, II., V., 10; III., 11; IV., 9.
 Poultry keeping, IV., 10.
 Prices in 1899, VI., 11.
 Root crops, V., 10; VI., 11.
 Rowen and fall feed, IV., 9; V., 10.
 Season, profits of the, VI., 12.
 Season, progress of the, I., 3, 10; II.-
 V., 3; VI., 4.
 Spraying, I., 11, 25.
 Spraying of crops for profit, article on, by
 Prof. S. T. Maynard, I., 25. Illustrated.
 Temperature and rainfall for the whole
 country, I., 6; II.-V., 5.
 Tobacco, IV., 9.
 Weather, Massachusetts, I., 4, 8; II., III.,
 V., 8; IV., 7; VI., 5.
 Weather and crops, New England, I.-III.,
 V., 7; IV., 6.

